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A Taxonomic Revision of *Anemone* L. Subgenus Anemonanthea (DC.) Juz. sensu lato (Ranunculaceae) III

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This is the last part of a taxonomic revision of *Anemone* subgenus Anemonanthea sensu lato. In Part III species nos. 23–32 are revised. Involucral leaves, flowers and achenes of the species accepted are illustrated here.

(Continued from J. Jpn. Bot. **79**: 196–206, 2004)

Key words: *Anemone*, morphology, subgenus Anemonanthea, taxonomy.

Ser. 7. **Exiguae** Ziman, Kadota & Bulakh in J. Jpn. Bot. **79**: 48 (2004).

23. **Anemone exigua** Maxim. in Bull. Acad. Sci. St.-Petersb. **23**: 306 (1876). TYPE: "Chine Prov. Kansu, terr. Tangut.", 1873, Przewalski (LE !).

Anemone exigua Maxim. var. *shanxiensis* B. L. Li & X. Y. Yu in Acta Phytotax. Sin. **27**: 152 (1989).

Anemone takasagomontana Masam. in Not. Syst. **6**: 37 (1937).

Anemonoides exigua (Maxim.) Starod., Vetrenytsy 123 (1991).

Rhizomes long-horizontal, stolon-like, 1–2 mm in diameter, and short oblique, 8–10 mm in diameter. Basal leaves 2–5; petioles basally vaginate, 5–10(–20) cm long, surrounded by fibrous remnants, puberulent; blades ternate, cordate-pentagonal, 2–3 × 2.5–4 cm, sparsely puberulent; petiolules 1–3 mm long; central leaflets 3-lobed, wide-rhombic; base cuneate; margin inciso-serrate; apex obtuse; lateral leaflets unequally 2-lobed, smaller. Scapes 5–15 (–25) cm long, sparsely puberulent above; cymes 1-flowered. Involucral leaves 3; petioles basally vaginate and connate, 1–1.5 cm × 3–5 mm; blades 3-parted to 3-lobed, smaller than in basal leaves, triangular-ovate to ovate, puberulent; petiolules 1–2 mm long. Pedicels 1–3 cm long, puberulent. Tepals 5(–6), elliptic-obovate, with narrow base and wide apex, white, pinkish or yellow, 4–8 × 3–5 mm, subglabrous or sparsely puberulent; basal veins 3–5, anastomosing veins absent. Stamens 3–4 mm long; filaments filiform; anthers ellipsoid, connectives narrow. Ovaries ovoid, with lateral ribs, 1.2–1.8 mm long, sparsely covered with hairs ca. 0.1 mm long or glabrous; styles apically uncinate, 0.5–0.7 mm long, stigmas linear (Fig. 2S). Achene bodies ovoid to ellipsoid, slightly compressed, with narrow ribs, 2.5–3 × 1.5 mm, sparsely puberulent (hairs ca. 0.1 mm long); styles uncinate, 0.5–0.7 mm long, glabrous; stigmas linear (Fig. 3O).

Chromosome number: unknown.

Distribution: China (S Gansu, E Quinghai, S Shanxi, W Sichuan, NW Yunnan); occurring in shady places, alt. 2000–3500 m.

Specimens examined: **CHINA**; Yunnan, Dshoni Valley, Tao-che, 31.5.1885, Potanin (LE); Lan Kien-ho, 31.3.1889, Delavay 43/2 (K); Lilijang, Yulong-Shan, He Shui, Lou Shan, 3350 m, 31.5.1985, Kunming 004 (E); Kansu, Monasterium Runwyz-ge, Tao-Che, 1885, Potanin (LE, MHA); Sichuan, Heoupin, pres Tchen-keou-tin, 3.6.1895, Farges 1341 (K, LE).

In describing *A. exigua*, Maximowicz (1876) noted in its 3-partite involucral leaves, small solitary flowers and sparsely puberulent small achenes. He thus regarded this taxon as close to *A. stolonifera*. As a result of our examination of the characteristics of the three foregoing species of sect. Rosulantes (including their types), we regard *A. exigua* as a high-mountain endemic species close to the *A. stolonifera–A. davidii* subgroup but which differs from them by its habit (all parts of plants are smaller); by the involucral leaf petioles 0.5–1 cm long; slightly reduced involucral leaf blades; solitary flowers having subglabrous tepals without vein anastomoses, and absence of staminodes.

The recently described *A. exigua* var. *shanxiensis* (B. L. Li and X. Y. Ya 1989) differs from *A. exigua* var. *exigua* by its yellow sepals and greater number of carpels. In our opinion, these distinctions however are within the limits of the variability of the species, and thus we are not recognizing var. shanxiensis in this treatment.

Masamune (1937) described *A. takasagomontana* from the flora of Taiwan, as a species close to *A. exigua*, but differing by its crenate leaf margins, shorter scapes (ca. 6 cm long), 1–3-flowered cymes, longer pedicels (4–6 mm long) and smaller sepals (ca. 5 mm long). These plants need more detailed study, and consequently at the present time their taxonomic state is debatable.

24. **Anemone griffithii** Hook. f. & Thoms., Fl. Brit. Ind. **1**: 24 (1855). TYPES: BHUTAN: near Chuka, 6000 ft., and Mishimi Hills, 1838, Griffith 1420 (holotype–K !); Sikkim, Lachen, 9000 ft., J. D. Hooker (paratype–K !); Hab. Sikkim, 8–9000 ft., J. D. Hooker (paratype–K); East Bengal, 1863, Griffith 21 (paratype–K !).

Anemone caerulea Lam. var. *griffithii* (Hook. f. & Thoms.) Ulbr. in Bot. Jahrb. **36**: 4 (1905).

Anemone nanchuanensis W. T. Wang in Acta Phytotax. Sin. **12**: 161 (1974). TYPE: CHINA: Sichuan, Nanchuan, Hsiao-ho-hsiang, 1650 m, 8.5.1957, C. H. Hsiung & T. L. Chow 90728 (PE !).

Anemonoides griffithii (Hook. f. & Thoms.) Holub in Folia Geobot. Phytotax. Praha **8**: 272 (1973).

Rhizomes long horizontal stolon-like, 1–2 mm in diameter, and short ascending, 4–7 mm in diameter. Basal leaves 3–6; petioles 5–8(–15) cm long, basally vaginate, surrounded by fibrous remnants, subglabrous; blades ternate, rhombic, 2–4 × 3–4 cm, sparsely appressed-puberulent; petiolules 2–5(–7) mm long; central leaflets 3-lobed, rhombic or rhombic-ovate; base broadly cuneate; margin subacutely serrate or incised; apex acute; lateral leaflets unequally 2-parted or 2-lobed, oblique-flabellate. Scapes solitary, 5–15(–20) cm long, sparsely puberulent above; cymes 1–2-flowered. Involucral leaves 3; petioles 5–10(–25) × 1–2 mm; blades ternate, similar to those in basal leaves, but larger, 2–5 × 3–6 cm, sparsely puberulent; petiolules 1–3 mm long; central leaflets 3-lobed, lateral leaflets 2-lobed and smaller. Pedicels 2–5(–7) cm long, densely puberulent. Tepals 5(–6), obovate-elliptic, with wide base and apex, white, pinkish or mauve, 6–8(–10) × 4–6 mm, subglabrous or sparsely puberulent; basal veins 3–5, anastomosing veins absent (rarely solitary). Stamens 3–6 mm long; filaments filiform; anthers ellipsoid, connectives nar-

row. Ovaries ovoid, 1–2 mm long, compressed, with ribs 0.1–0.2 mm wide, subglabrous; styles 0.2–0.5 mm long; stigmas subglobose (Fig. 2T). Achene bodies ovoid, compressed, with ribs 0.1–0.2 mm wide, 3–4 × 2–3 mm, glabrous; styles slightly curved, ca. 0.5 mm long, glabrous; stigmas slightly dilated.

Chromosome number: unknown.

Distribution: China (Sichuan–Guan Xian, Nanchuan, S Xizang), India, Bhutan, Nepal, Sikkim; occurring in forests, by streams, alt. 1600–3000 m.

Specimens examined: **INDIA**; Assam: Delu Valley, 9000 ft., Tsuga forests, 29.6.1928, Kingdon-Ward 8389 (K). **BHUTAN**; Rudo La, Pimi, 9000 ft., 16.4.1949, Ludlow et al. 2012 (K); Batte Dzong, Ha Chu, 8500 ft., 19.4.1949, Ludlow et al. 16065 (K); Ha Chu, 10 mi below Ha Dzong, 9000 ft., 1.5.1949, Ludlow et al. 16127 (GH, K, E); E side of Dochu La, E of Thimphu, 2750 m, forests, Grierson & Long 1052 (K).

This species was described by Hooker f. and Thomson (1855) as a taxon close to *A. nemorosa* and *A. ranunculoides* on the basis of small plants with horizontal woody rootstocks, 3-partite leaves, 1–2-flowered scapes, and a white or pinkish perianth. Although Ulbrich (1905) regarded this taxon as only a variety of *A. caerulea*, in their treatment of a modern flora of India, Sharma et al. (1993) accepted it as a species and noted its horizontal rhizomes, 3-foliolate basal and involucral leaves, 4–5 subglabrous tepals, compressed glabrous ovaries and achenes.

Anemone griffithii is allied to *A. exigua* but differs from it by its narrower free involucral leaf petioles, glabrous ovaries and achenes. However, its most significant distinctions include the ternate (not 3-parted to 3-lobed ones as in *A. exigua*) involucral leaf blades and nearly sessile subglobose stigmas. With this type of stigmas, *A. griffithii* together with *A. davidii* form a link between sectt. Anemonanthea and Stolonifera.

Wang, in 1974, described *A. nanchuanensis* as a Chinese endemic (Sichuan, Nanchuan) very close to *A. griffithii* (differing by the short rhizomes, 3-sected involucral leaf blades and glabrous ovaries). These features are characteristic of *A. griffithii*, and later Wang (1980) did not include this species in the flora of China. In this treatment we also do not accept this taxon as a species but we believe it is only an aberrant form of *A. griffithii*.

25. **Anemone scabriuscula** W. T. Wang in Acta Phytotax. Sin. **12**:160 (1974). TYPE: CHINA: Yunnan, Chiutien, Sinchu, 2900 m, 11.9.1958, W. T. Wang 6184/3123 (holotype–PE !).

Rhizomes vertical or slightly oblique, short, branched, 2–4 cm × 6–10 mm. Basal leaves 2–5; petioles 6–10 cm long, basally vaginate, surrounded by fibrous remnants, sparsely puberulent or subglabrous; blades 3-sected, pentagonal or pentagonal-ovate, 3–7 × 3–8 cm, strigose, foveolate and roughish; bases cordate; petiolules 1–2 mm long; central segments 3-lobed, rhombic; base cordate; margin inciso-serrate; apex long-acuminate; lateral segments unequally 2-parted, oblique-flabellate. Scapes 4–6 cm long, puberulent above; cymes 1-flowered. Involucral leaf petioles 0.5–1 cm × 1–2 mm; blades 3-sected, similar to those in basal leaves, but smaller, 1.5–3.5 × 2–4 cm, sparsely puberulent; petiolules 1–2 mm long; central segments 3-parted to 3-lobed; lateral segments 2-parted. Pedicels ca. 2 cm long, densely substrigose. Tepals 5, obovate, with narrow base and rounded apex, white, 5–7 × 3–4 mm, densely puberulent; basal veins 3–5, vein anastomoses absent. Stamens 2–3 mm long; filaments filiform; anthers ellipsoid; apices minutely mucronate. Ovaries ovoid, ca. 2.5 mm long, glabrous; styles curved, ca. 1 mm long; stigmas linear. Achenes not observed.

Chromosome number: unknown.

Distribution: China (W Yunnan: Judian of Lijiang County); occurring in forests and

semi-shadow slopes, alt. 3000 m.

Wang (1974) described this taxon as very close to *A. davidii* but differing mainly by its smaller leaves, scapes and flowers. According to our data, *A. scabriuscula* differs from *A. davidii* by its lack of long rhizomes, its 1-flowered scapes, and much smaller tepals (5–7 mm long only) without vein anastomoses. Like *A. griffithii*, *A. scabriuscula* has narrow involucral leaf petioles, glabrous ovaries and achenes (rare in sect. Anemonanthea), but it differs from the latter by smaller 3-sected involucral leaf blades. In our opinion, this taxon should receive additional study, including a careful comparison of its achenes.

Sect. III. **Tuberosa** (Ulbr.) Juz., Fl. URSS **7**: 241 (1937).

26. **Anemone apennina** L., Sp. Pl. 541 (1753). TYPE: "Habitat in Apennines, Anglia. Ranunculus nemorosus, florae caeruleo." N.710.28. (lectotype designated here–LINN !).

Anemone caerulea Lam., Encycl. 318 (1779).

Anemone pyrenaica Pall. ex Pritz. in Linnaea **15**: 640 (1841).

Anemone caerulescens Lange, Haand. Dan. Fl. 585 (1886).

Anemone apennina Ledeb., Fl. Ross. **1**: 14 (1842).

Rhizomes tuberous, cylindroid, branched, 15–20 × 7–12 mm. Basal leaves 1–2, developing before flowering; petioles 10–20 cm long, scarcely pubescent, with underground scale-like wide basal parts ("ears") 5–8 × 8–10 mm; blades ternate, pentagonal, 3–4 × 3.5–4 cm, scarcely pubescent; petiolules 3–5 mm long; central leaflets 3-parted; base cuneate; margin shallowly inciso-dentate; apex acute; lateral leaflets similar to central ones, but 2-parted. Scapes 10–20(–30) cm long, 1-flowered, glabrous. Involucral leaf petioles 15–30 × 1–2 mm; blades ternate to 3-sected, similar to those in basal leaves, 1.5–3.0 × 3–5 cm, densely pubescent; petiolules 2–5(–10) mm long (Fig. 1T). Pedicels 5–10 cm long, scarcely pubescent. Tepals 12–14(–18), oblong-elliptic, blue-violet, whitish or yellowish, dimorphic, in two circles: outer tepals with dark spots at base, 15–20 × 5–6 mm, scarcely pubescent along the central vein or basally; basal veins 5–7, vein anastomoses 1–3; inner tepals 12–14 × 3–4 mm, glabrous; basal veins 3–5, anastomosing veins absent. Stamens 4–6 mm long, filaments linear, basally slightly dilated, anthers oblong, connectives wide. Ovaries subovoid, puberulent, ca. 1 mm long; styles curved, ca. 1 mm long; stigmas linear (Fig. 2U). Achene bodies elongate-ellipsoid, basally narrowed, 3–3.5 × 1.6–1.8 mm, sparsely puberulent (hairs ca. 0.1 mm long); slightly comressed, with narrow ribs; styles curved, pressed to achene bodies, 0.5–0.7 mm long, glabrous; stigmas linear (Fig. 3P).

Chromosome number: n = 8, 16 (Baumberger 1970).

Distribution; Europe: Italy, Bulgaria, Albania, Jugoslavia, Greece, Corsica and Sicily; occurring mainly in semi-shade, alt. 500–1500 m.

Specimens examined: **ITALY**; Neapoli, 10.3.1841, Heldreich (W); Castellamare, 1844, Leresche (KW); Florentia, 25.3.1861, Cesari (KW); Lucania, 15.4.1922, Orphanides (KRA); Roma Prov., Lazic, 6.4.1993, Iberite (LE). **GREECE**; Attica, Pentelico, 13.3.1850, Orphanides (KW). **JUGOSLAVIA**; Montenegro, 10.5.1934, Piejovich (KRA). **MACEDONIA**; Orlovo Brdo, prope Krilovak, 31.3.1965, Majer (KRAM). **CHERNOGORIA**; Pasmo Lovzanee, Cetyni do Ivanovej Kority, 24.5.1973, Jasiewicz (KRAM).

Anemone apennina was described by Linnaeus (1753) as having tuberous rhizomes and a 10–12-leaved perianth. According to Pritzel (1841), *A. apennina* was characterized by its scarcely puberulent, ternate basal leaves, glabrous scapes and involucral leaves, and solitary flowers having 12–18 elongate tepals with obtuse apices. Grenieer and Gordon (1848) noted the

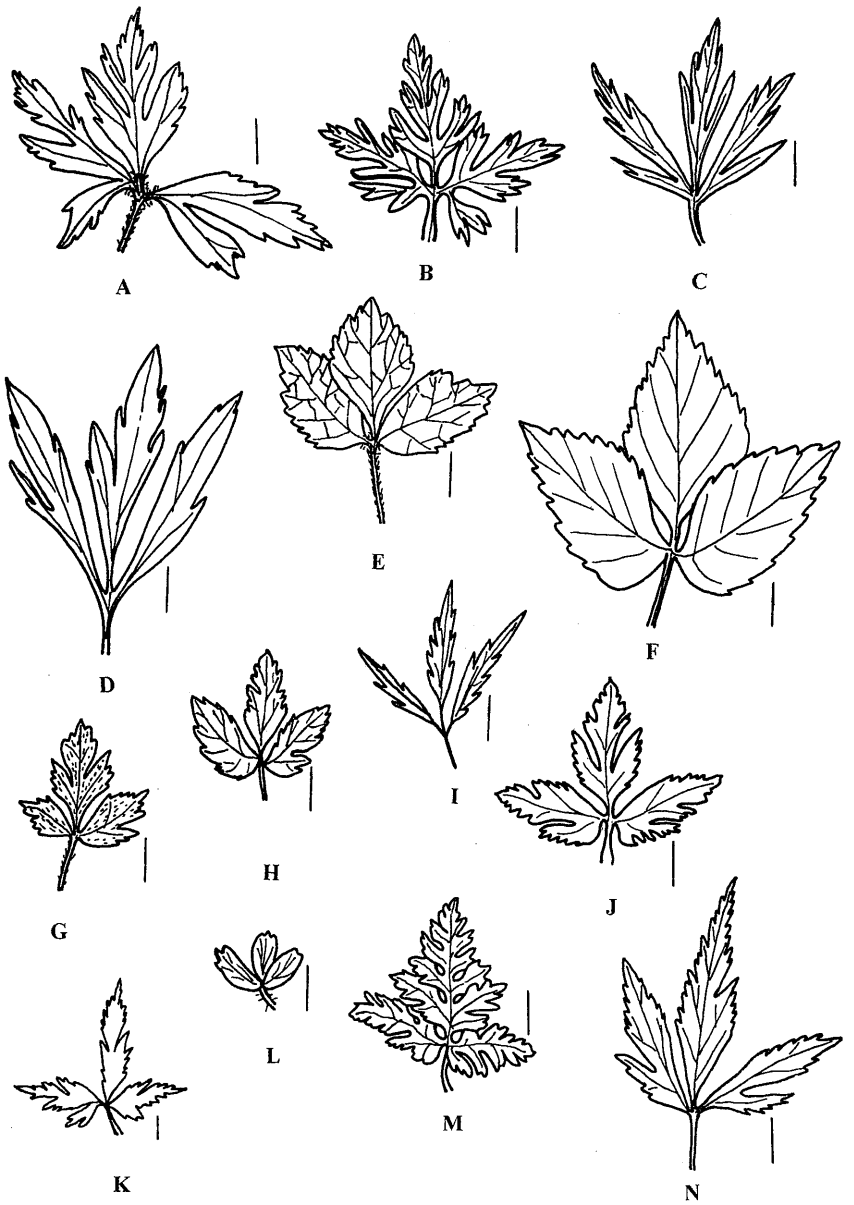

Fig. 1. Involucral leaves of *Anemone* species. A. *A. nemorosa*–Ukraine, Kyiv Reg., Boyarka, wet forest, 12.4.1915, Semenkewich (KW). B. *A. amurensis*–Russia, Far East, Khabarovski Reg., Voznesenskoe villge, 17.5.1910, Kuznetsov (KW). C. *A. caerulea*–Russia, Tomskyi Reg., close Tomsk, forest, 2.5.1923, Krylow (KW). D. *A. ranunculoides*–Ukraine, Kyiv Reg., Golosievo, forest, 8.5.1940, Visjulina (KW). E. *A. udensis*–China, Uzimi, 10.6.1905, Sjuzev (LE). F. *A. trifolia*–Italy, Apennynes, 1811, Gaudin (LE). G. *A. umbrosa*–Korea, Prov. Cham-gyon, Mt. Musanga, 4.6.1897, Komarov (LE). H. *A. soyensis*–Russia, Sakhalin, close Dolinsk, 23.5.1953, Gyzha & Motoryna (KW). I. *A. debilis*–Russia, Sakhalin, vicinity of South Sakhalinsk, Kanuma, 5.10.1948, Popov (LE). J. *A. altaica*–Russia, Novosibirsk Reg., Toguchinski Distr., Kotorovo, 7.6.1974, Lashchinski & Volkova (KW). K. *A. pseudoaltaica*–Japan, Insula Jesso, circa Hakodate, 1861, Albrecht (LE). L. *A. raddeana*–Japan, Saitama Pref., Chichibu-gun, Mt. Buko, 1917, Makino 33964 (LE). M. *A. nikoensis*–Japan, Kochi Pref., Takaoka-gun, Niyodo-mura, Mt. Torigata, 22.5.1889, Makino 33961 (LE). N. *A. reflexa*–Mongolia, Noin-Ula, 1925, Glagolev (LE). Scale indicates 1 cm.

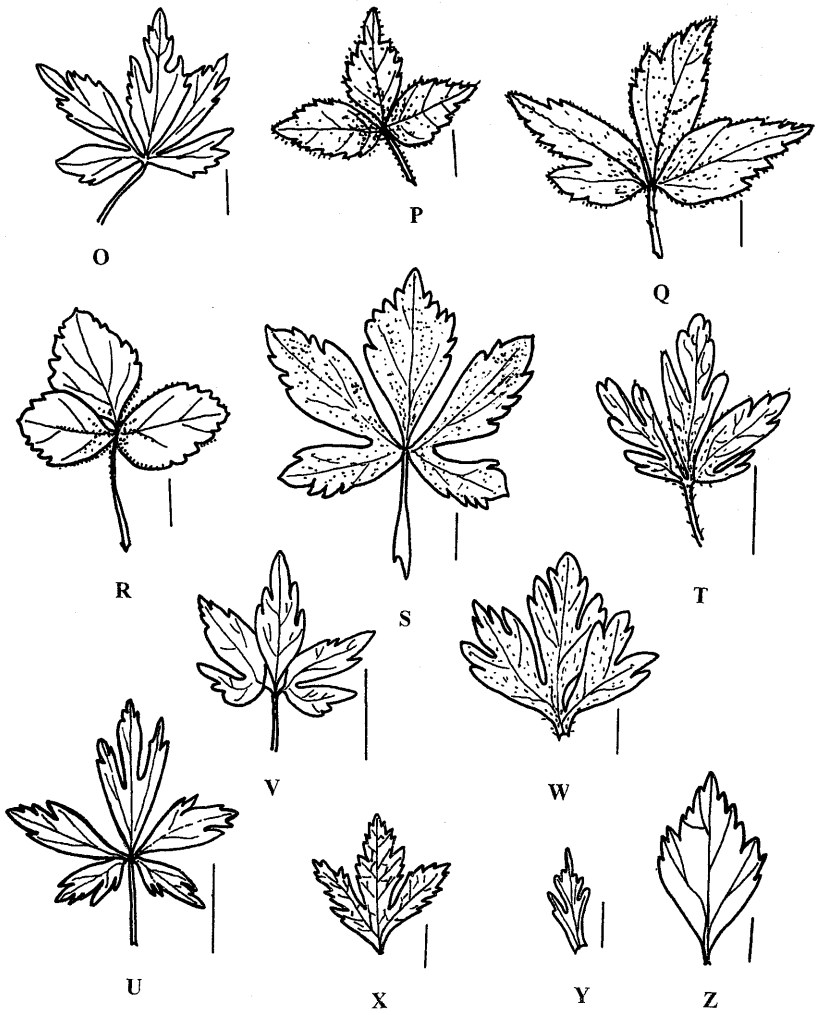

Fig. 1. Continued. O. *Anemone quinquefolia*–Canada, Ontario, Hearst, Cochraic Distr., 2.6.1954, Baldwin (LE). P. *A. lancifolia*–U. S. A., N Carolina, Lee Co., 4 mile W of Moncure, 4.4.1967, Logne 951 (BM). Q. *A. piperi*–U. S. A., Idaho, Ceur D'Alene Mts., 1610 m, 11.7.1895, Leiberg 1259 (GH). R. *A. grayi*–U. S. A., Washington, Clallam Co., Mt. Angeles, 17.6.1931, Thompson 7431 (K). S. *A. oregana*–U. S. A., Washington, Grays Harbor Co., Col.Bob, 3.5.1931, Thompson 6247 (K). T. *A. apennina*–Greece, Pentelico, 13.3.1850, Orphanides (KW). U. *A. blanda*–Russia, Stavropol Reg., close Stavropol, 21.4.1992, Fedoronchuk (KW). V. *A. caucasica*–Georgia, prope Tiflis, 6.4.1861, Ruprecht (LE). W. *A. baicalensis*–China, Manchuria, Chara Murin, 1835, Fischer (LE). X. *A. flaccida*–Russia, Kuriles, Kunasir, Urvinovo, 9.6.1963, Egorova 1028 (MHA). Y. *A. keiskeana*–Japan, Yamashiro Prov., inter Hozukyo et Kameoka, 15.9.1959, Murata 5972 (LE). Z. *A. deltoidea*–U. S. A., Oregon, Pierce Co., Indian Reservation, 16.5.1937, Eyerdam (LE). Scale indicates 1 cm.

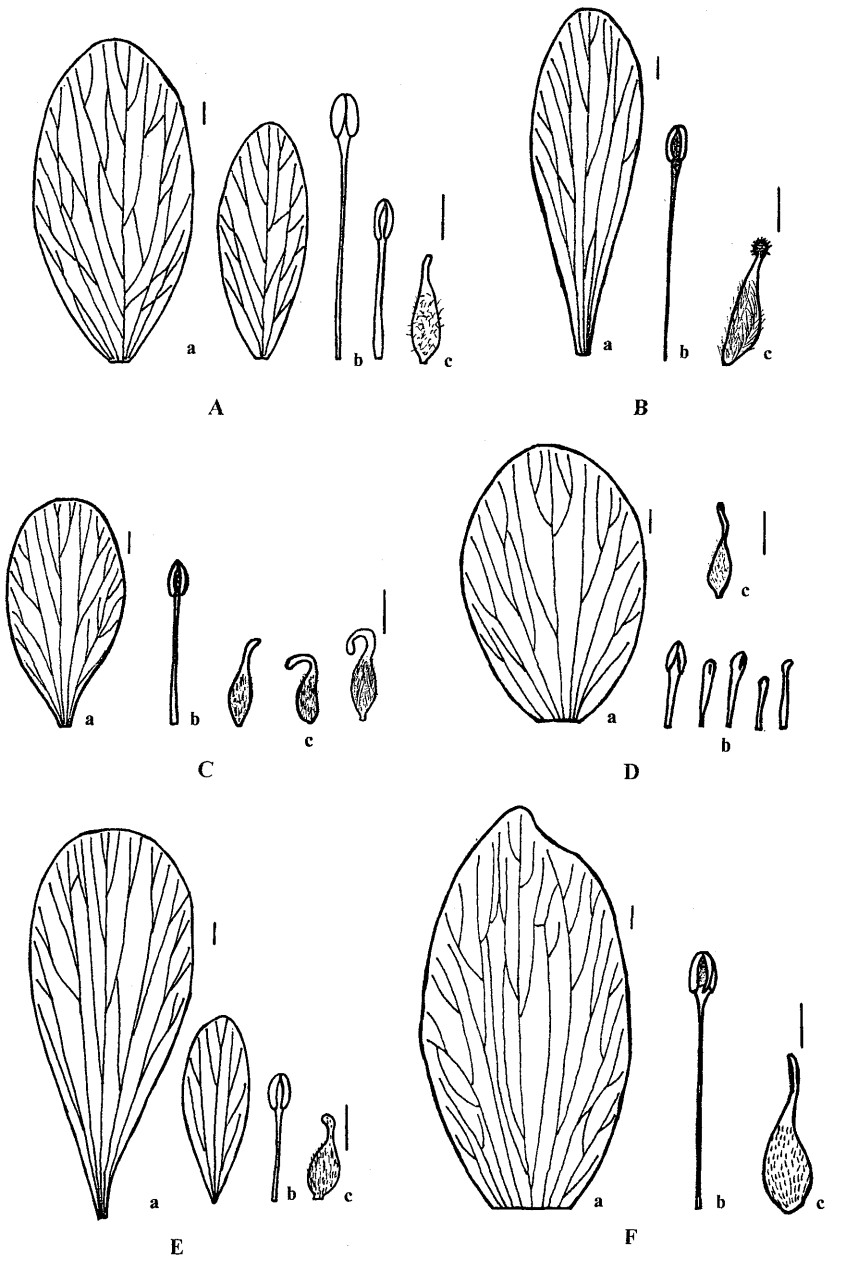

Fig. 2. Flowers of *Anemone* species. Elements of flowers: a-sepal, b-stamen, c-carpel. A. *A. nemorosa*–Ukraine, Kyiv Reg., Boyarka, wet forest, 12.4.1915, Semenkewich (KW). B. *A. amurensis*–Russia, Far East, Khabarovski Reg., Voznesenskoe villge, 17.5.1910, Kuznetsov (KW). C. *A. caerulea*–Russia, Tomskyi Reg., close Tomsk, forest, 2.5.1923, Krylow (KW). D. *A. uralensis*–Russia, C Ural, Sverdlovski Reg., Mt. Georgievski, 21.7.1979, Storozheva (MHA). E. *A. ranunculoides*–Ukraine, Kyiv Reg., Golosievo, forest, 8.5.1940, Visjulina (KW). F. *A. udensis*–China, Uzimi, 10.6.1905, Sjuzev (LE). Scale indicates 1 mm.

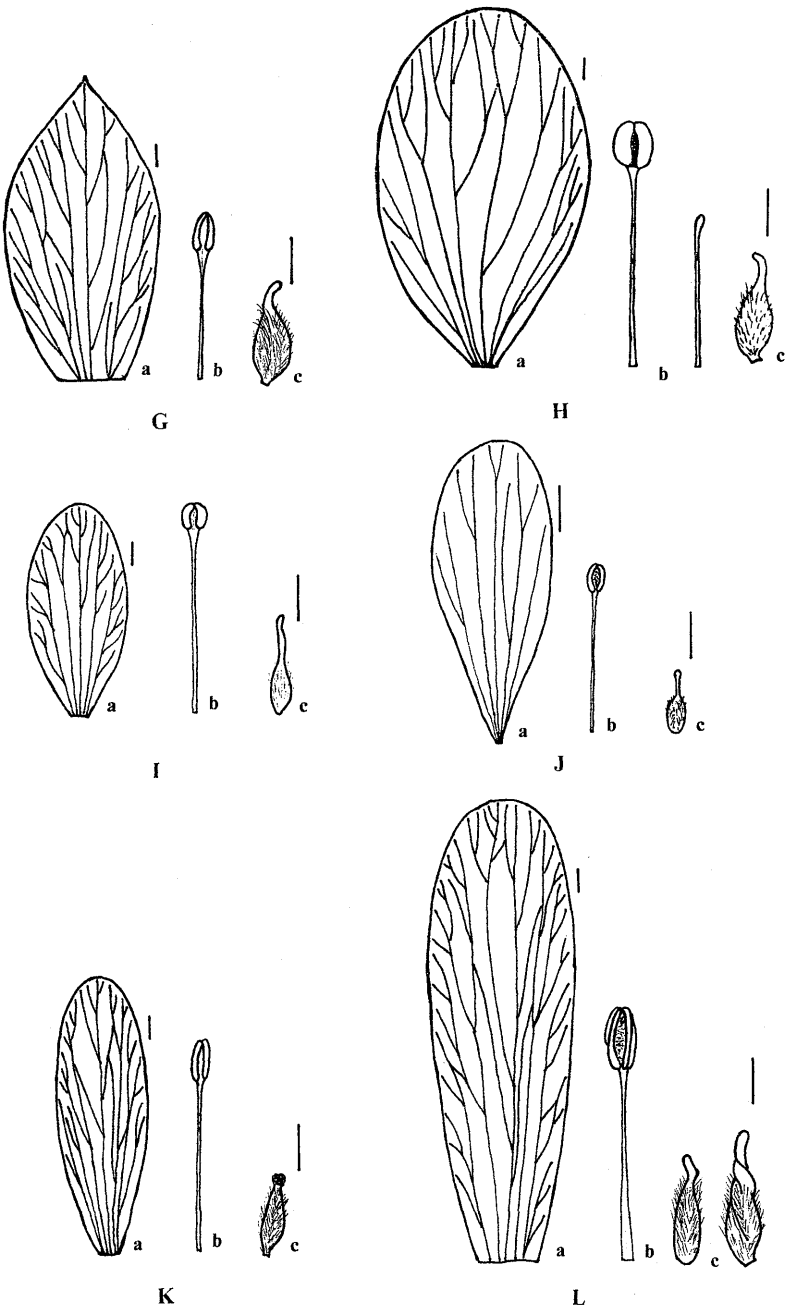

Fig. 2. Continued. G. *Anemone trifolia*–Italy, Apennynes, 1811, Gaudin (LE). H. *A. umbrosa*–Korea, Manchuria, Prov. Cham-gyon, Mt. Musanga, 4.6.1897, Komarov (LE). I. *A. soyensis*–Russia, Sakhalin, close Dolinsk, 23.5.1953, Gyzha & Motoryna (KW). J. *A. debilis*–Russia, Sakhalin, vicinity South Sakhalinsk, Kanuma, 5.10.1948, Popov (LE). K. *A. altaica*–Russia, Novosibirsk Reg., Toguchinski Distr., Kotorovo, 7.6.1974, Lashchinski & Volkova (KW). L. *A. pseudoaltaica*–Japan, Insula Jesso, circa Hakodate, 1861, Albrecht (LE). Scale indicates 1 mm.

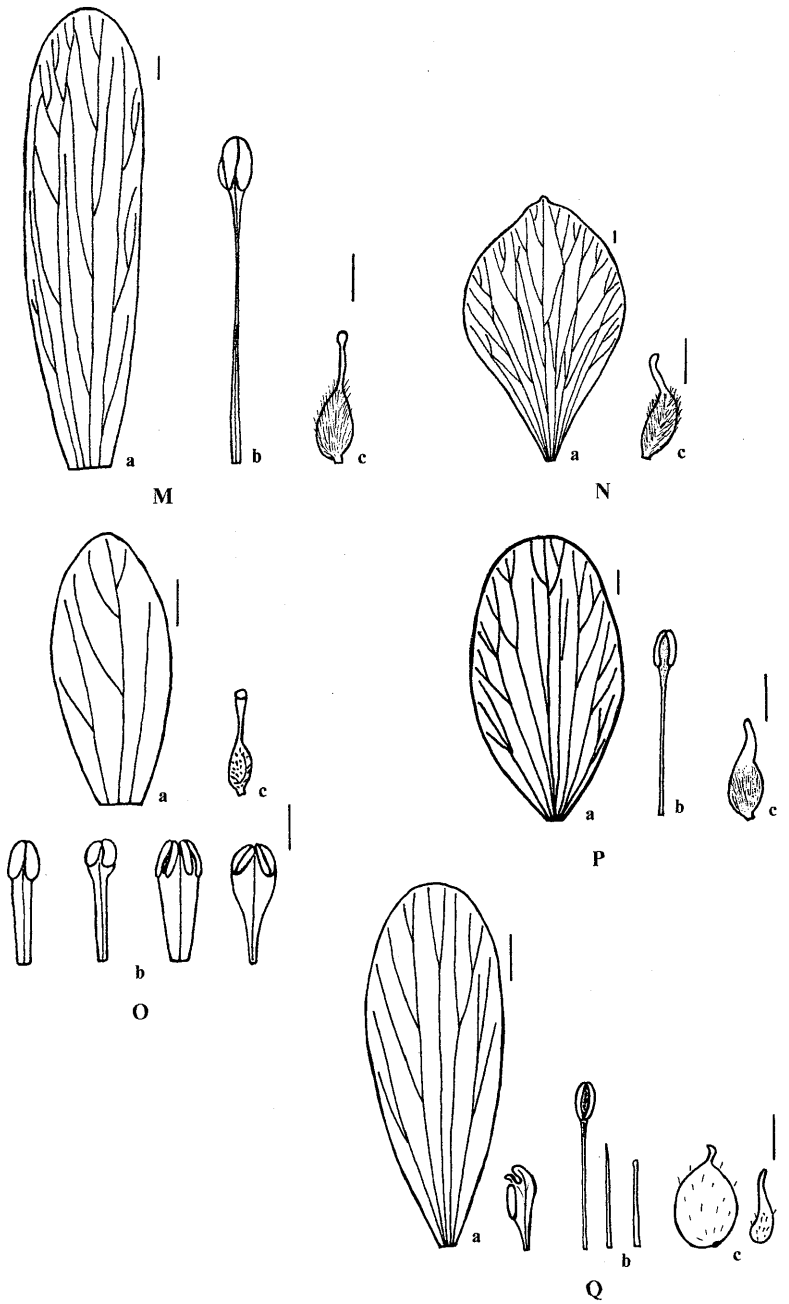

Fig. 2. Continued. M. *Anemone raddeana*–Japan, Saitama Pref., Chichibu-gun, Mt. Buko, 1917, Makino 33964 (LE). N. *A. nikoensis*–Japan, Kochi Pref., Takaoka-gun, Niyodo-mura, Mt.Torigata, 22.5.1889, Makino 33961 (LE). O. *A. reflexa*–Mongolia, Noin-Ula, 1925, Glagolev (LE). P. *A. quinquefolia* -Canada, Ontario, Hearst, Cochraic Distr., 2.6.1954, Baldwin (LE). Q. *A. stolonifera*–Japan, Honshu, Nagano Pref., Kamiina-gun, Miwa-mura, near Oguro, 19.6.1965, Kanai & al. (LE). Scale indicates 1 mm.

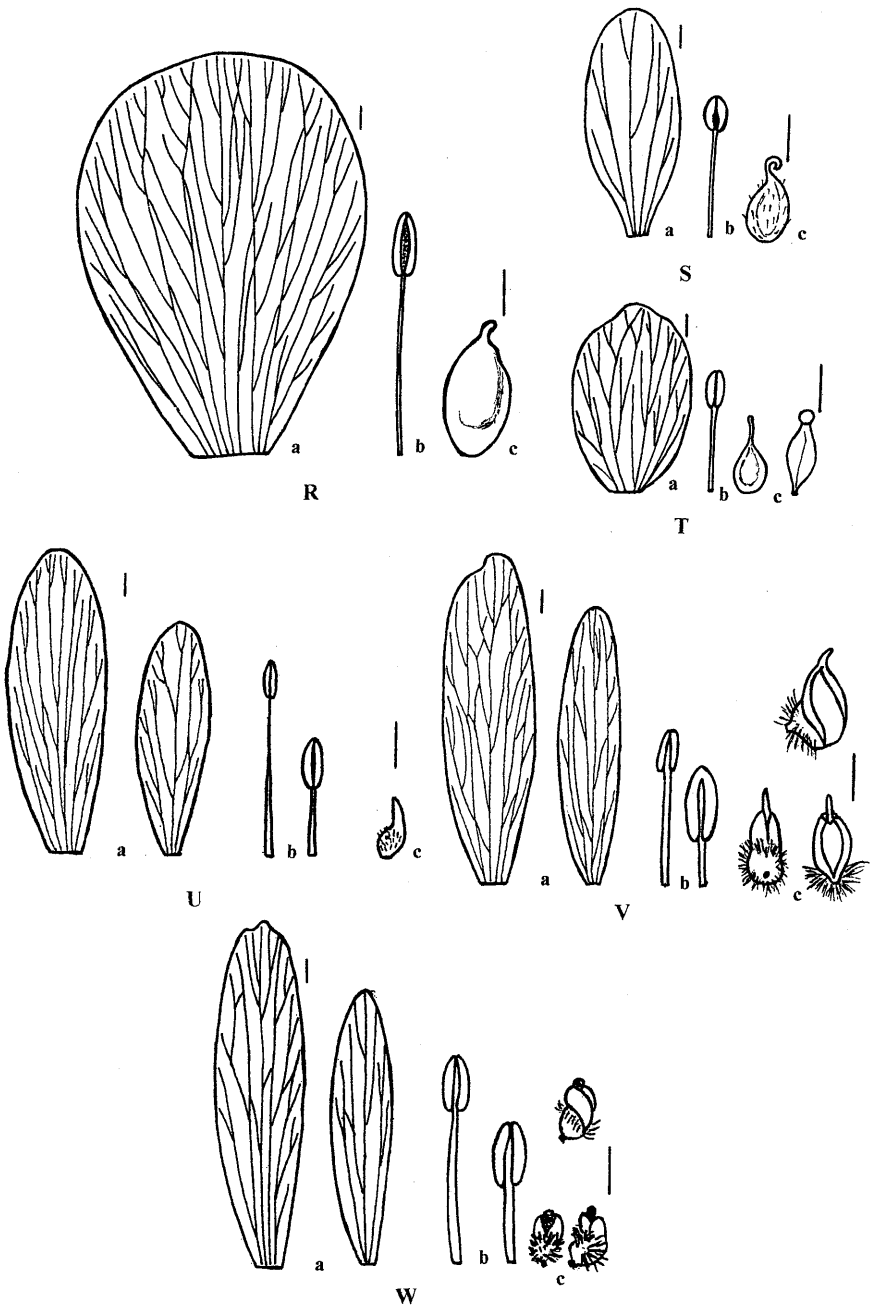

Fig. 2. Continued. R. *Anemone davidii*–China, Sichuan, Tchen-keou-tin, 11.5.1882, Farges (LE). S. *A. exigua*–China, Yunnan, Dshoni Valley, Tao-che, 31.5.1885, Potanin (LE). T. *A. griffithii*–Bhutan, Batte Dzong, Ha Chu, 8500 ft., 19.4.1949, Ludlow & al. 16065 (K). U. *A. apennina*–Italy, Castellamare, 1844, Leresche (KW). V. *A. blanda*–Russia, Stavropol Reg., close Stavropol, 21.4.1992, Fedoronchuk (KW), prope Tiflis, 6.4.1861, Ruprecht (LE). W. *A. caucasica*–Georgia, prope Tiflis, 6.4.1861, Ruprecht (LE). Scale indicates 1 mm.

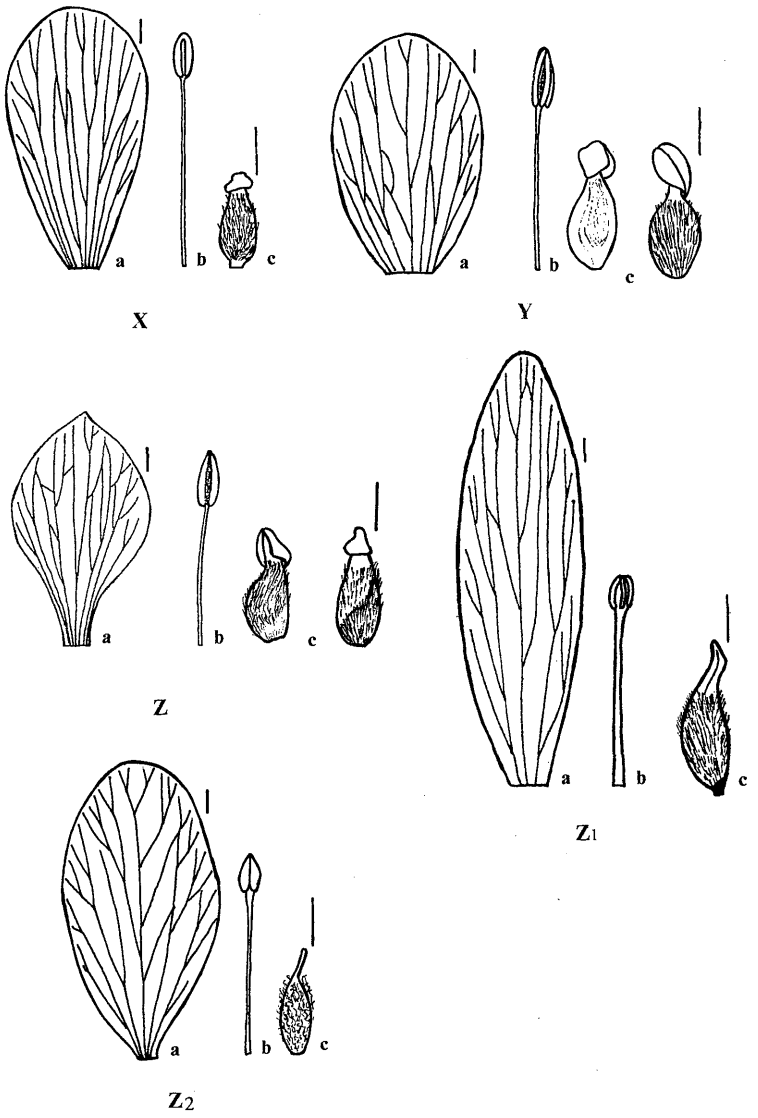

Fig. 2. Continued. X. *Anemone baicalensis*–China, Manchuria, Chara Murin, 1835, Fischer (LE). Y. *A. flaccida*–Russia, Kuriles, Kunasir, Urvinovo, 9.6.1963, Egorova 1028 (MHA). Z. *A. delavayi*–China, Yunnan, E slope of Tsanj-Shanj Range, vlose Mt. Dali, 3000 m. 30.5.1955, An. Fedorov et al. 1478 (LE). Z_1. *A. keiskeana*–Japan, Honshu, Hiroshima Pref., Miyoshi City, Miwaka Town, 2.3.2003, Kubota 718643 (TNS). Z_2. *A. deltoidea*–U.S.A., Pierce Co., Indian Reservation, 16.5.1937, Everdam (LE). Scale indicates 1 mm.

petiolate involucral leaves resembling the basal ones and the basally pubescent blue tepals.

Candolle (1824) regarded this taxon as consisting of two varieties: var. *ranunculus nemorosus* (with shortly petiolulate leaf segments and white flowers) and var. *parvula* (with sessile leaf segments, smaller flowers).

According to our data, the most essential characters of *A. apennina* are cylindroid

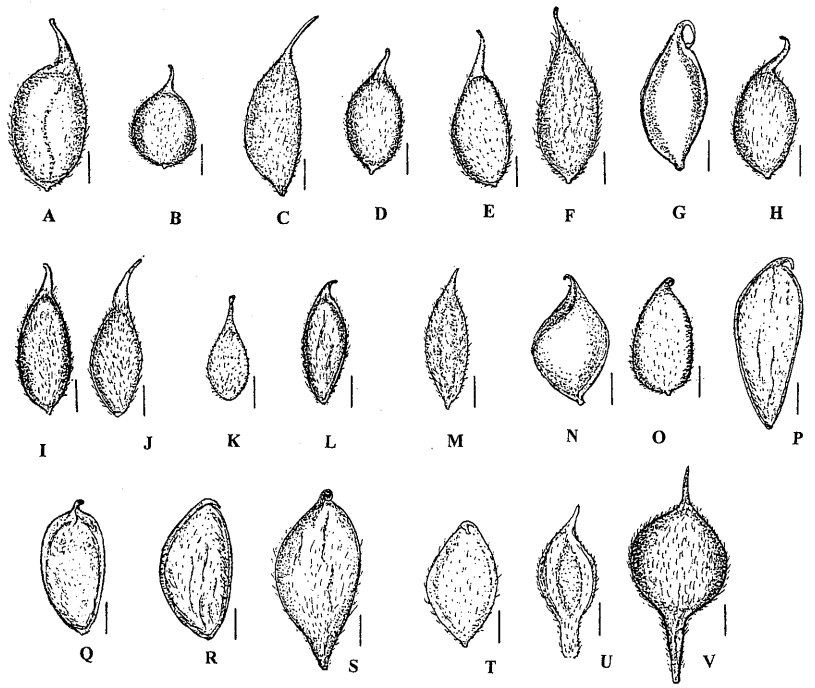

Fig. 3. Achenes of *Anemone* species. A. *A. nemorosa*–Ukraine, Transcarpatia, Svaliava Distr., Poliana Kvasova, 28.5.1998, Ziman (KW). B. *A. ranunculoides*–Romania, Banatus, Timis Baile Lipova, 23.4.1943, Borza (CLUJ). C. *A. udensis*–Russia, Far East, Vladivostok, Sputnik, 1.6.1980, Jakubov (MHA). D. *A. trifolia*–Spain, Lusitania, Gyag, 3.1887, Aragon & Castro (K). E. *A. debilis*–Russia, Far East, Sakhalin, South-Sakahlinsk, 16.6.1980, Starodubtsev (VLA). F. *A. altaica*–Russia, Pechorskyi Reg., 1881, Ivanitski (MHA). G. *A. pseudoaltaica*–Japan, Hokkaido, Oshima Subpref., Nanae Town, Onuma Park, 150 m, 10.5.2003, Igarashi (TNS). H. *A. reflexa*–Russia, Primorski Reg., Suchanski Distr., Tigrovaja Balka, 21.5.1964, Gorovoy 5079 (MHA). I. *A. quinquefolia*–Canada, Ontario, Long Rapids, Mattagani river, Hudson Bay, 20.6.1956, Baldwin 6188 (GH). J. *A. lancifolia*–USA, Virginia, Salt Pond Mt., 31.5.1890, Brown & al. (GH). K. *A. piperi*–U. S. A., Idaho, Ceur D'Alone Mts., 11.7.1895, Leiberg 1259 (GH). L. *A. grayi*–U. S. A., California. San Mateo Co., King's Mts., 18.3.1902, Greene 323 (K). M. *A. oregana*–Washington, Kittitas Co., N side of Lake Keechelus, 27.5.1939, Hitchkok & Martin 4674 (GH). N. *A. davidii*–China, E Sitchuan, Distr. Tghen-keou, 11.5.1892, Farges 946 (P). O. *A. exigua*–N China, Dshoni, Valley H.Tao-che, 31.5.1885, Potanin (LE). P. *A. apennina*–Russia, Stavropol Reg., close Stavropol, 21.4.1992, Fedoronchuk (KW). Q. *A. blanda*–Russia, Stavropol Reg., near Stavropol, 21.4.1992, Fedoronchuk (KW). R. *A. caucasica*–Iran, Gorgan, 28.4.1935, Gauba (WU). S. *A. baicalensis*–China, Manchuria, Chara, Murin, 1835, Fischer (LE). T. *A. flaccida*–Russia, Kuriles, Kunasir, Urvinovo, 9.6.1963, Egorova 1028 (MHA). U. *A. keiskeana*–Japan, Yamashiro Prov., inter Hozukyo et Kameoka, 15.9.1959, Murata 5972 (LE). V. *A. deltoidea*–U. S. A., Washington, Mt. Rainier National Park, 5.8.1916, Hunnewall (NY). Scale indicates 1 mm.

horizontal rhizomes, 3-sected basal and involucral leaves, a dimorphic perianth, basally dilated filaments, ovaries and achenes without lateral ribs, and we have no reason to accept its infrageneric taxa.

27. **Anemone blanda** Schott & Kotschy in Österr. Bot. Wochenbl. **4**: 129 (1854). TYPE: TURKEY: "In monte Tauro. Aestate 1836", Kotschy (isotype designated by Demiriz in 1967–K !).

Anemone blanda Stev., Fl. Cauc. Crit. **3**: 103 (1902).

Anemone apennina L. subsp. *blanda* (Schott & Kotschy) Hayek, Prodr. Fl. Balc. **1**: 317 (1927).

Rhizomes tuberous, cylindroid, branched, 15–30 × 5–10 mm. Basal leaves 1–2, developing before flowering; petioles 8–15 cm long, scarcely pubescent or glabrous, with underground scale-like wide basal parts ("ears") 5–8 × 8–10 mm; blades 3-sected, pentagonal, 3–4 × 3.5–4 cm, scarcely pubescent; petiolules absent or 1–2 mm long; central leaflets 3-parted; base cuneate; margin shallowly inciso-dentate; apex obtuse; lateral leaflets similar to central ones, but 2-parted. Scapes 10–25 cm long, 1-flowered, glabrous. Involucral leaf petioles 15–25 × 1–2 mm; blades 3-sected, similar to those in basal leaves, 1.5–3.0 × 3–5 cm, densely pubescent; petiolules 1–3 mm long Pedicels 5–10 cm long, scarcely pubescent. Tepals 9–15, linear-oblong, blue, whitish or pink, glabrous, dimorphic, in two circles: outer tepals 10–25 × 2–5 mm; basal veins 3–5, anastomosing veins 5–9; inner tepals 8–15 × 2–3 mm; basal veins 3–4, vein anastomoses 1–4. Stamens 2.5–5.5 mm long, filaments filiform, anthers ellipsoid, connectives wide. Ovaries ovoid, slightly compressed, puberulent at the base, ca. 1 mm long; styles oblique, 0.1–0.2 mm long; stigmas dilated (Fig. 2V). Achene bodies ellipsoid, 2–2.2 × 1.2–1.3 mm, compressed, with narrow lateral ribs, sparsely puberulent at the base (hairs ca. 0.1 mm long); styles slightly curved, 0.1–0.2 mm long, glabrous; stigmas slightly dilated (Fig. 3R).

Chromosome number: n = 8, 16 (Baumberger 1970).

Distribution: Caucasus (Russia, Georgia), Balkans (Greece, Jugoslavia, Albania, Bulgaria), Asia Minor (Turkey, Syria); occurring in semi-shaded-localities in forests, shrubs, and in open mountain slopes, alt. 900–1500 m.

Specimens examined: **RUSSIA**; Stavropol Reg., near Stavropol, 21.4.1992, Fedoronchuk (KW). **GREECE**; Attica, Pentelico, 3.4.1891, Halacsy (WU); Cephalonia, Ainos, 19.5.1951, Bolos & al. (BCC); Rodhos Isl., Mt. Profet Elias, 24.3.1965, Davis 40348 (K). **CYPRUS**; Buffabento, 7.3.1938, Loch (K); Madhari, Sarendi, 1.3.1971, Gnichard (K); Adelphi, Yironos Range, 2.4.1974, Meible (K). **TURKEY**; Prov. Balikesir, Bigadic, 21.3.1956, Davis & Polunin 25138 (K); Antalya, Avlan, S of Golu, 29.4.1959, Hennipman 789 (K); Prov. Pontus, Distr. Trabzon, Zigana Pass summit, Pontic Alps, 17.5.1960, Furse (K); Kayseri, Pinarbasi to Gurun, Ziyaret Tepesi, 23.5.1965, Code 1347 (K); Vil. Gumushane, 23.5.1975, Jasiewicz (KRAM); Fundort, 30.3.1985, Rechinger (WU). **SYRIA**; Damascus, 4.6.1885, Kotschy (KW). **LEBANON**; Jabal el Knaisse, 8.4.1959, Polunin 5225 (K); Col of Dahr el Baidar, E of Beirut, 9.3.1966, Archibald 1095 (K).

Ulbrich (1906) regarded *A. apennina* and *A. blanda* as "species collectiva". According to Hayek (1927), *A. blanda* is a subspecies of *A. apennina* but differing from subsp. *apennina* mainly by its glabrous leaves and perianth. Juzepchuk (1937) noted in *A. blanda* the large variability of leaf and stem hairiness, and tepal number and size. According to Davis et al. (1965), *A. blanda* is distributed mainly in Asia Minor (Turkey) and the Caucasus, but also in the Balkans, where this *A. blanda* shows an overlapping of morphological characters with *A. apennina* which occurs predominately in Europe.

Chater (1973) considered that the area of *A. blanda* is limited in the central part of the Mediterranean, and he emphasized the strong similarity between *A. apennina* and *A. blanda*, as well as the variability of their essential morphological characters. Therefore, Chater regarded their distinction at the species level as artificial.

According to our data, plants of *A. blanda* differ from plants of *A. apennina* by their shorter basal leaf petiolules (1–2 mm) and blades, shape of involucral leaf blades (3-sected, with acute or obtuse ultimate lobules), tepal size and shape (smaller, linear-

oblong, with more vein anastomoses), and hairiness (glabrous in *A. blanda*), filament base shape (filiform), carpel shape and hairiness (with lateral ribs and pubescent only at the base), and smaller achenes. As a result of our study, we regard *A. blanda* as a distinct species.

28. **Anemone caucasica** Willd. ex Rupr., Fl. Cauc. 14 (1869). TYPE: "Iberia Caucaso et ad ripas Sinoia" (holotype–B).

Anemone apennina L. var. *parvula* DC., Prodr. **1**: 19 (1824).

Anemone blanda Boiss. var. *parvula* (DC.) Boiss., Fl. Orient. **1**: 13 (1867).

Anemone apennina Bieb., Fl. Taur. Cauc. **2**: 286 (1869).

Rhizomes semiglobose, branched, 8–12 × 5–8 mm. Basal leaves 1(–2), developing before flowering; petioles 5–8(–10) cm long, glabrous, with basal underground scale-like glabrous "ears" 5–8 × 4–5 mm; blades ternate, 1.5–2.0 × 2–3(–4) cm, glabrous; petiolules 1–2 mm long; central leaflets 3-parted; base cuneate; margin shallowly serrate-dentate; apex obtuse; lateral leaflets similar to basal ones, but bipartite. Scapes 1–3(–5), 10–15(–20) cm long, glabrous; cymes 1-flowered. Involucral leaf petioles 5–15 mm long; blades ternate, subglabrous, 1.5–2 × 2–2.5 cm, petiolules 1–2 mm long; central leaflets wide-lanceolate, with entire lobules or few teeth; lateral leaflets bipartite (Fig. 1V). Pedicels 2–3 (up to 5) cm long, densely pubescent. Tepals 8–10, linear-lanceolate, with wide base and apex, blue or whitish, dimorphic, glabrous: outer ones 8–12 × 3–4 mm, basal veins 5–7, vein anastomoses 1–3; inner ones 7–8 × 2 mm, basal veins 3, anastomosing veins absent. Stamens 2–4 mm long; filaments filiform; anthers ellipsoid, connectives wide. Ovaries ovoid, 0.5–0.8 mm long, basally covered with hairs 0.1 mm long; styles slightly curved, 0.2–0.3 mm long; stigmas subcapitate (Fig. 2V). Achene bodies elongate-ellipsoid, slightly asymmetric and slightly compressed, with ribs ca. 0.5 mm wide, 2–2.2 × 1–1.2 mm, sparsely puberulent (hairs ca. 0.1 mm long); styles slightly curved, 0.2 mm long, glabrous; stigmas slightly dilated (Fig. 3S).

Chromosome number: unknown.

Distribution: Caucasus: Armenia, Georgia, Russia, Turkey, N Iran; occurring in shrubs and meadows, alt. 700–2300 m.

Specimens examined: **RUSSIA**; Stavropol Reg., near Bot. Gard., 21.4.1992, Fedoronchuk (KW). **GEORGIA**; prope Tiflis, 6.4.1861, Ruprecht (LE); N Caucasus, 9.6.1932, Vvedenski (KW). **ARMENIA**; inter Trapezunten et Baibout, 5.1853, Huet du Pavillon (K). **IRAN**; Gorgan, 28.4.1935, Gauba (WU); Ardebil Talysh, 24.5.1963, Bowles 555 (K).

According to Juzepchuk (1937), *A. caucasica* differs from *A. blanda* in its smaller rhizomes, shorter petioles of the involucral leaves, smaller sepal number and size, and short-curved achene styles. Nevertheless, Juzepchuk regarded *A. caucasica* as the geographical variant of the W. European *A. apennina*. According to Davis et al. (1965), both *A. blanda* and *A. caucasica* occur in Turkey, with the latter differing from the former mainly in its glabrescent involucral leaves; 8–11 blue or white sepals, these usually 7–13 mm long, and smaller and more delicate stems.

Anemone caucasica differs from both *A. apennina* and *A. blanda* mainly in the shape of the rhizomes (subspherical and cylindroid); shorter basal and involucral leaf petioles; shape of ultimate leaf lobules (obtuse and acute); smaller flower and achene size, but ribs in *A. caucasica*, achenes wider, and subcapitate stigmas.

Subgenus **Stolonifera** (Ulbr. ex Juz.) Ziman, Kadota & Bulakh in J. Jpn. Bot. **79**: 48 (2004).

Sect. 4. **Stolonifera** (Ulbr. ex Juz.) Juz., Fl. URSS **7**: 241 (1937).

Ser. 8. **Stolonifera**: Ziman, Kadota & Bulakh in J. Jpn. Bot. **79**: 49 (2004).

29. **Anemone baicalensis** Turcz. in Bull. Soc. Nat. Mosc. **15**: 40 (1842). TYPE: "Ad

torr. Chara-Murin et Wydrenka, 1835", Turczaninov, Herb. Hooker (holotype–K !); "Ad ripam inendivadesu Baicali, 1836", Turczaninov (paratype–LE !).

Rhizomes short ascending, branched, 4–6 mm in diameter, but sometimes long-horizontal, stolon-like branches ca. 1 mm in diameter (often not found). Basal leaves 2–3 with distinct blades (scale-like leaves absent), developing before flowering; petioles basally vaginate (their remnants sometimes seem to be scale-like leaves), 10–15(–20) cm long, pubescent or subglabrous; blades 3-sected, reniform-pentagonal, 3–5 × 4–7(–10) cm, puberulent; bases cordate; margins lobulate-dentate, apices obtuse; segments subsessile; central segments 3-lobed or toothed in upper part, broadly rhombic; lateral segments 2-parted, oblique-flabellate. Scapes solitary, (5–)10–25(–30) cm long, puberulent or subglabrous; cymes 1(–2)-flowered. Involucral leaves 3, sessile; blades 2–3-parted or 3-lobed in upper part, rhombic or lanceolate, unequal, 1–3 × 2–4 cm (Fig. 1W). Pedicels 3–8(–10) cm long, pubescent. Tepals 5(6–7), obovate, with rounded bases and apices, white, 10–15 × 6–7 mm, sparsely pubescent or subglabrous; basal veins 3–5, anastomosing vens 3–5. Stamens 4–7 mm long; filaments filiform; anthers oblong-ellipsoid; connectives narrow. Ovaries ovoid, basally rounded, 1.5–2.5 mm long, sparsely covered with hairs ca. 0.1 mm long; styles 0.2–0.5 mm long; stigmas subglobose (Fig. 2Y). Achene bodies basally narrowed, oblong-ovoid, slightly compressed, with narrow ribs, 4–5 × 2–2.5 mm, sparsely puberulent (hairs ca. 0.1 mm long); styles hooked, ca. 0.5 mm long, basally puberulent; stigmas slightly dilated (Fig. 3S).

Chromosome number: n = 8 (Baumberger 1970).

Distribution: RUSSIA (Siberia), China (S Gansu, NW Sichuan, Yunnan, E Heilongjiang, Jilin, Liaoning, S Shanxi), N Korea, Mongolia; occurring in forests and bushes or grassy slopes, alt. 500–3100 m.

Specimens examined: **RUSSIA**; Primorje, Amur river, near the village of Daiso, Maximowicz (LE); Vladivostok Reg., 1910, Vojnovska-Kriger (MHA); Khasan Distr., Furugelma Isl., 5.1975, Zdorovjeva (MHA); Kavalerovski Distr., Povorot, 22.5.1980, Starodubtsev (MHA); close Vladivostok, Sedanka, 7.6.1981, Starodubtsev (VLA); Amurski Reg.: Arkharinski Distr., Mutnaja, 4.7.1981, Nedoluzhko & Starodubtsev (MHA). **CHINA**; Kansu, Wutu, 2500 m, 19.6.1930, C. S. Hao 432 (PE); Sichuan: Tghen-keou-Tin, Farges 386 (LE); Paohsing, 1954, T. P. Soong 38347 (K); Pu-hsi-Kou, 2300 m, 2.5.1959, AS 245 (K); Manchuria: Matsiokhe, 11.5.1905, Sizov (LE). **KOREA**; Prov.Chamgim: Distr. Musany, 22.5.1897, Komarov (LE).

The distinct features of the carpels and achenes (minute styles but thickened subsessile stigmas) are the basis for inclusion of *A. baicalensis* and its allied taxa in sect. Stolonifera or the genus *Arsenjevia*. In addition, its rhizomes are mainly short and stout, and the long thin rhizomes are stolon-like, but because of their short duration they are not always observed (cf. sect. Stolonifera). However, on the basis of the morphological features of above-ground shoots and their seasonal rhythms, *A. baicalensis* is closer to plants of subsect. Rosulantes (not the *A. flaccida*-subgroup), on the basis of its several basally vaginate basal leaves which develop before flowering and are surrounded by fibrous remnants.

Anemone baicalensis differs from *A. flaccida* in the absence of bracteoles and fewer flowers and sepal veins anastomosing. *Anemone baicalensis* is a variable taxon, leading to the description of several narrowly-defined species: Wang (1974) described *A. kansuensis* as a Chinese endemic (Kansu) which was distinguished from *A. ulbrichiana* by its hairiness (appressed) and stigma shape (elliptic-turbinate). Another narrow Chinese endemic, *A. saniculiformis* C. Y. Wu, was distinguished by its 3-lobed basal leaf central segments and bilobate lateral ones.

We accept *A. baicalensis* including four

varieties, viz, vars. *baicalensis*, *glabrata*, *kansuensis* and *saniculiformis*, but we regard most of the previoulsy described allied taxa (viz., *A. litoralis*, *A. ulbrichiana*) as synonyms of *A. baicalensis* because their defining the characteristics are within the limits of the variability of *A. baicalensis*.

Key to the varieties of *Anemone baicalensis*

1a. Basal leaf petioles and scapes pubescent or puberulent 2
1b. Basal leaf petioles and scapes glabrous; ovaries glabrous .....29b. var. *glabrata*
2a. Basal leaf petioles and scapes spreadingly puberulent .....29a. var. *baicalensis*
2b. Basal leaf petioles and scapes appressed-puberulent 3
3a. Tepals 7–8 mm long; stigmas elliptic-turbinate .....29c. var. *kansuensis*
3b. Tepals 10–20 mm long; stigmas globose .....29d. var. *saniculiformis*

29a. var. **baicalensis**

Anemone rossii S. Moore in J. Linn. Soc. Bot. **17**: 376 (1879). TYPE: CHINA: "Hab. in sylvis ad latere collium prope Funghwang-chung" (holotype).

Anemone ulbrichiana Diels ex Ulbr. in Notizbl. Bot. Gart. Berl. **10**: 876 (1929). TYPE: CHINA: N Shensi, Huan tou shan, Giraldi 7006 (lectotype).

Anemone baicalensis var. *rossii* (S. Moore) Kitag., Lineam. Fl. Manch. 213 (1939).

Anemone brevistyla Chang ex W. T. Wang in Acta Phytotax. Sin. **12**: 162 (1974). TYPE: CHINA: "Sichuan, Tienchuan, 1936, K. L. Chu 2419" (holotype–K !)

Anemonoides baicalensis (Turcz.) Holub in Folia Geobot. Phytotax. Praha **8**: 155 (1973).

Anemonoides rossii (S. Moore) Holub, l. c. (1973).

Arsenjevia baicalensis (Turcz. ex Ledeb.) Starod., Vetrenytsy 122 (1991).

Arsenjevia rossii (S. Moore) Starod., l. c. (1991).

29b. var. **glabrata** Maxim., Prim. Fl. Amur. 18 (1859). TYPE: "Amur river, near the village of Daiso", Maximowicz (holotype–LE).

Anemone glabrata (Maxim.) Juz., Fl. URSS **7**: 197 (1937).

Anemone baicalensis subsp. *glabrata* (Maxim.) Kitag., Rep. Inst. Res. Manch. **4**: 81 (1940).

Anemone baicalensis var. *litoralis* Litw. in sched., ad Herb. Fl. Ross. **6**: 117 (1908).

Anemone littoralis (Litw.) Juz., l. c. (1937). TYPE: Vicinity of Vladivostok (lect otype–LE !).

Anemonoides glabrata (Maxim.) Starod., l. c. (1991).

29c. var. **kansuensis** (W. T. Wang) W. T. Wang in Fl. Reipubl. Popul. Sin. **28**: 20 (1980).

Anemone kansuensis W. T. Wang in Acta Phytotax. Sin. **12**: 163 (1974). TYPE: CHINA: Kansu, Wutu, 2500 m, 19.6.1930, C. S. Hao 432 (holotype–PE !).

29d. var. **saniculiformis** (C. Y. Wu ex W. T. Wang) Ziman & B. E. Dutton, Fl. China **6**: 312 (2001).

Anemone saniculiformis C. Y. Wu ex W. T. Wang in Acta Phytotax. Sin. **12**: 164 (1974). TYPES: CHINA: Sichuan, Paohsing, 1954 T. P. Soong 38347 (holotype–K !); Pu-hsi-Kou, 2300 m, 2.5.1959, AS 245 (paratype–K !).

30. **Anemone prattii** Huth ex Ulbr. in Bot. Jahrb. **36** (Beibl. 80): 4 (1905). TYPE: Yunnan boreo-orienti: Ma-chia-tsun prope Chiao-chia, Ten in Ducloux 5678 (holotype –P !).

Anemone nemorosa Finet in J. Bot. 21 (1908).

Arsenjevia prattii (Huth ex Ulbr.) Starod., Vetrenytsy 122 (1991).

Rhizomes oblique, short, 5–7 mm in diameter, with long slender terrestrial stolons, ca. 1 mm in diameter. Basal leaves 2–3; peti-

oles 5–15 cm long, glabrous; blades 3-sected, cordate-pentagonal, 3–3.5 × 5–5.5 cm, adaxially sparsely puberulent, abaxially subglabrous; base cordate; segments subsessile; central segment 3-lobed, rhombic, base cuneate; secondary lobes subpinnately divided, ultimate lobules broadly lanceolate, narrowly ovate or ovate; lateral segments 2-parted, oblique-flabellate. Scapes 10–30 cm long, sparsely puberulent above; cymes 1(–2)-flowered. Involucral leaves 3, sessile, blades 3-lobed, unequally rhombic, puberulent. Pedicels 3.5–8 cm long, puberulent. Tepals 5, elliptic-obovate, with rounded bases and apices, white, 8–10 × 4–7 mm, sparsely puberulent, veins 3–5, anastomosing vein absent. Stamens 4–5 mm long, filaments filiform; anthers ellipsoid, connectives narrow. Ovaries ovoid, 2–3 mm long, densely covered with hairs ca. 1 mm long; styles straight, less than 1 mm long; stigmas subglobose. Achenes lacking.

Distribution: China (W Sichuan, N Yunnan (Cikai, Qiaojia), in shady places under forests in valleys, alt. 1700–2400 m.

This species is rather close to *A. baicalensis* and differs from it mainly by having terrestrial (not underground) stolons, and solitary flowers with smaller sepals lacking anastomosing vein.

Ser. 9. **Flaccidae** Juz., Fl. URSS **7**: 252 (1937).

31. **Anemone flaccida** F. Schmidt in Acad. Sci. Petersb. Ser. 7, **2**: 103 (1868).

TYPE: Russia. "Due and the village of Mgachi in Sakhalin, Augustinowicz" (holotype–LE !, isotype–K !).

Rhizomes oblique, short, 5–10(–15) mm in diameter, branched, sometimes also with long-horizontal stolon-like branches, 1–1.5 mm in diameter. Basal leaves 3–4, scale-like (5–8 × 5–8 mm), and several leaves, with distinct blades, developing after flowering; solitary leaves develop on rhizomes apart from the reproductive shoots (having basally vaginate petioles) and 2–3 leaves at the bases of the reproductive shoots (with basally slightly dilated petioles), 10–25(–30) cm long, scarcely puberulent or subglabrous; blades 3-sected, reniform-pentagonal, 3.5–8 × 6–10(–14) cm, adaxially sparsely puberulent; bases cordate; margins denticulate; apices obtuse or acute; segments shortly petiolulate (1–2 mm long) or sessile; central segments 3-lobed, rhombic, ultimate lobules triangular or broadly lanceolate; lateral segments 2-parted, oblique-flabellate. Scapes 1–3, 15–25(–40) cm long, sparsely puberulent or subglabrous; cymes 2–3(–5)-flowered. Involucral leaves 3(–5), subsessile; blades deeply to medially 3-lobed, unequal, 3–6 × 5–8 cm, sparsely puberulent; lobes mainly rhombic, shallowly incised, cuneate, obtuse (Fig. 1X). Bracteoles 1–2, 6–15 × 3–7 mm, lanceolate, entire or 3-lobed. Pedicels 4–7 cm long, sparsely puberulent. Tepals 5(–6), obovate-elliptic, with rounded bases and apices, white, pink or yellowish, persistent, 6–10 (–20) × 3–5(–10) mm, glabrescent or sparsely appressed-puberulent; basal veins 5–9, anastomosing veins 7–9. Stamens 3–5 mm long; filaments filiform; anthers ellipsoid or oblong, connectives narrow. Ovaries ovoid, basally narrowed, ca. 2 mm long, densely covered with hairs 0.2–0.3 mm long; styles hardly recognizable (0.1–0.2 mm long); stigmas capitate (Fig. 2Y). Achene bodies ovoid, 3–4 × 1.5–2.5 mm, sparsely puberulent (hairs ca. 0.1 mm long) or glabrate; styles straight, ca. 0.5 mm long, glabrous; stigmas subcapitate (Fig. 3T).

Chromosome number: n = 7 (Kurita 1956, Nishikawa 1985).

Distribution: Russia (Far East–Primorje, Sakhalin), Japan (Hokkaido, Honshu, Shikoku, Kyushu), China (S Anhui, Guizhou, Hubei, Hunan, S Jiangsu, Jiangxi, Sichuan, NW Yunnan, NW Zhejiang); occurring in forests and shady grassy places, alt. 400–3000 m.

Specimens examined: **RUSSIA**; Primorje Reg., close Vladivostok, Sedanka, 18.5.1980, Starodubtsev (VLA); Sakhalin, Novoaleksandrovsk, 20.5.1977, Chernjaeva (MHA); Pilovaja, 20.6.1980, Starodubtsev 6516 (VLA); Juzhno-Sakhalinsk, 11.6.1980, Starodubtsev 6501 (VLA); Kuriles, Kunasir, Urvinovo, 9.6.1963, Egorova 1028 (MHA). **CHINA**; Yunnan, Les bois a Tang Yong Tchang (Lang Kong), 5.1887, Delavay (LE); Chien-chuan-Mekong, 10000 ft., 7.1922, Forrest 21495 (K); Hubei, Hofeng, Xiao ring, 15.8.1958, Li Hung-Jun 6122 (K); Anhui, Jinzhai, Bai Ma Zhai, Xi Da Wa, 1300 m, 14.5.1984, K.Yao 8915 (K). **JAPAN**; Hokkaido, Kanayama, Minemi-furano-cho, Sorachi-gun, 27.5.1987, Tsugaru & Ivinoru 7768 (MHA); Honshu, Miyagi Pref., Tomiya-machi, Numata, 1985, Akinari (NY); Natori-shi, Oosawa, 13.5.1984, Tateishi & al. 10139 (K); Tamatsukuri-gun, Onikoube, Nurugu-sawa, 7.7.1987, Kajita 194 (MHA); Shibata-gun, 30.4.1989, Nishinosomo 104 (MHA); Tokyo, Asakawa, 5.5.1959, Tanaka (K); Nagano Pref., Mt. Yakushi, Kitaazami-gun, 31.5.1977, Tsugaru 3385 (MHA); Shiga Pref., Mt. Ibuki, 1000 m, 19.5.1963, Murata & Koyama (LE); Ishikawa Pref., near Maruyama-hatsudensho, Komatsu-shi, 28.4.1985, Tsugaru & Takeuchi 7851 (MHA); Kyoto Pref., Ashimidani, Keihoku-cho, Kita Kuwata-gun, 25.4.1987, Tsugaru & Takahashi 8005 (MHA); Shikoku, Kochi Pref., Ootoyo-mura, Nagaoka-gun, 5.5.1893, Makino 33955 (LE);

Anemone flaccida shares carpel and rhizome features (subsessile thickened stigmas and short perennial and long stolon-like rhizomes) with *A. baicalensis* and other taxa of sect. Stolonifera. However, it shares morphological aspects of the above-ground shoots (basal leaves with distinct blades which develop after flowering, although the large scale-like leaves are persistent) with the taxa of sect. Anemonanthea. This species is rather variable and it includes several varieties (most of them were described initially as new species).

Key to the varieties of *Anemone flaccida*

1a. Rhizomes both long and short; tepals white to pink; ovaries with narrow bases; stigma globose 2
1b. Rhizomes short only; tepals white to reddish-purple; ovaries with rounded bases; stigma turbinate or broadly ovoid.....3
2a. Basal leaf petioles and scapes glabrous to subglabrous; cymes 2–3-flowered; involucral leaf blades mainly 4–6 cm long; tepals 7–10 mm long..... .....31a. var. *flaccida*
2b. Basal leaf petioles and scapes hirsute; cymes 4–5-flowered; involucral leaf blades ca. 3 cm long; tepals 5–6 mm long .....31b. var. *hirtella*
3a. Tepals 5, white, 10–15 mm long; anthers mucronate at apex; stigma mainly turbinate...31. var. *hofengensis*
3b. Tepals 4–8, reddish-purple, 6–10 mm long; anthers apiculate at apex; stigma broadly ovoid .....31d. var. *anhuensis*

31a. var. **flaccida**

Anemone baicalensis Turcz. subsp. *flaccida* (F. Schmidt) Ulbr. in Bot. Jahrb. **37**: 232 (1906).

Anemone baicalensis Turcz. var. *laevigata* A. Gray in Perry Narrat. Exp. Chin. Jap. **2**: 306 (1857).

Anemone laevigata (A. Gray) Koidz. in Bot. Mag. Tokyo **43**: 395 (1929).

Anemonoides flaccida (F. Schmidt) Holub in Folia Geobot. Phytotax. Praha **8**: 166 (1973).

Arsenjevia flaccida (F. Schmidt) Starod., Vetrenytsy 123 (1991).

31b. var. **hirtella** W. T. Wang in Fl. Reipubl. Popul. Sin. **28**: 349 (1980). TYPES: CHINA: Anhui, W. G. Ge 87101, 87102, 87114, 87125, 87126, 87127 (aodem loco) (paratypes–PE !).

31c. var. **hofengensis** (W. T. Wang) Ziman & B. E. Dutton, Fl. China **6**: 311 (2001).

Anemone hofengensis W. T. Wang in Acta Phytotax. Sin. **29**: 463 (1991). TYPE: CHINA: Hubei, Hefeng, Xiao ping, 15.8.1958, H. J. Li 6122 (holotype–PE !).

31d. var. **anhuensis** (Y. K. Yang) Ziman & B. E. Dutton, Fl. China **6**: 311 (2001).

Anemone anhuensis Y. K. Yang in J. Wuhan Bot. Res. **7**: 327 (1989). TYPE:

CHINA: Wubu, Anhui, Qingyang Xian, Jiuhuashan, Tiantai, 1000 m, 16.04.1987, W. G. Ge 87103 (holotype–PE).

Plants of var. *flaccida* are distributed throughout the area of species; var. *hirtella* occurs in SW Hubei (Lichuan), in valleys by streams, alt. 1000 m; var. *hofengensis* occurs in SW Hubei, NW Hunan and E Sichuan in valleys by streams, alt. 1200–1800 m; and var. *anhuensis* occurs in S Anhui (Mt. Jiuhuasshan), in *Pinus* forests, in mountain valleys, alt. 1000 m.

32. **Anemone delavayi** Franch. in Bull. Soc. Bot. Fr. **33**: 366 (1886). TYPE: CHINA: "Yun-nan, ad margines silvarum supra declivitates cultas ad Mao-kon-tchang, prope Tapin-tze, 2200 m", 18.5.1885, Delavay 1504 (holotype–K !); Yunnan: Kou-toui, Mo-go-yu, 3000 m, 16.4.1887, Delavay (paratypes–K !, P !); supra Mo-so-yn, 17.6.1887, Delavay (paratypes-K !, P !).

Rhizomes short, stout, branched, 4–7 mm in diameter, also with long horizontal stolon-like branches, ca. 1 mm in diameter. Basal leaves 2–3, scale-like (3–4 mm long), and solitary, with distinct blades, developing after flowering; petiole 3–10 cm long, puberulent above; blade 3-sected, pentagonal, 2–4 × 2–5 cm, sparsely puberulent; base cordate; margins dentate; apex acute or acuminate; petiolules 1–2 mm long; central segments rhombic-ovate or rhombic; lateral segment smaller, unequally 2-lobed. Scapes 5–10(–20) cm long, puberulent above; cymes 1(–2)-flowered. Involucral leaves 3; subsessile; blades 3-parted or 3-lobed, rhombic-ovate or elliptic, 1–3 × 2–5 cm; base cuneate; margins denticulate or entire, apex obtuse; sparsely puberulent. Pedicels 2–6 cm long, puberulent. Tepals 5, elliptic-obovate, with narrow bases and rounded to acuminate apices, white and reddish tinged or blue, 7–15 × 5–7 mm, sparsely puberulent; basal veins 3–5, anastomosing veins absent (rarely solitary). Stamens 4–7 mm long; filaments filiform; anthers narrow-ellipsoid; connectives narrow. Ovaries ovoid, 1.5–2 mm long, densely covered with hairs 0.2–0.3 mm long; styles 0.2–0.4 mm long; stigmas turbinate (Fig. 2Z). Achene bodies ovoid, 3–4 × 2 mm, densely puberulent (hairs ca. 0.5 mm long), styles ca. 0.5 mm long; stigmas thickened.

Distribution: China (SW Sichuan, NW Yunnan); in forests and moist places near forest margins, alt. 2400–3000 m.

Specimens examined: **CHINA**; Yunnan: 2200 m, 18.5.1881, Delavay 1504 (LE); supra Tapinze, 2200 m, 17.5.1885, 1909, Delavay (LE); bois de Kou-toui, an nord de Yang-in-chan (Lan-Kong), 16.4.1887, Delavay (P); Che tcho Tu, 2000 m, 1.6.1887, Delavay (P); Che tcho Tu, 2000 m, 2.6.1887, Delavay (P); Mts. S of Churiho, near Honchin and Chiuho, S of Likiang, 28.5.1922, Rock 4084 (P); E slope Tsanj-Shanj Range, close Mt. Dali, 3000 m, 30.5.1955, An. Fedorov, Linchewski & Kirpichnikov 1478 (LE).

Anemone delavayi was recognized as a member of the Stolonifera-group (Ulbrich 1906, Wang 1974, Tamura 1995), and Wang (1974) regarded it as a taxon close to *A. baicalensis*.

After examining ample herbarium material, we came to the conclusion that this species is closer to *A. flaccida* because of the development of basal leaves with distinct blades after flowering and having several scale-like persistent leaves. It differs from *A. flaccida* in having solitary basal leaves with blades, solitary scapes and 1-flowered cymes, and larger tepals lacking anastomosing veins.

Pei (1933) regarded that *A. oligocarpa* differed from *A. delavayi* by its smaller flowers (tepals 5–6 × 3 mm), and sessile turbinate stigmas. These distinctions correspond at the varietal level only, and following Wang et al. (2001), we are accepting two varieties of *A. delavayi*, viz., var. *delavayi* and var. *oligocarpa* which differ in tepal size and stigma shape. The former variety occurs in NW Yunnan and the latter one in SW Sichuan.

32b. var. **oligocarpa** (C. J. Pei) Ziman &

B. E. Dutton, Fl. China **6**: 311 (2001).

Anemone oligocarpa C. J. Pei in Contrib. Biol. Lab. Sci. Soc. China **9**: 3 (1933). TYPE: CHINA: Sichuan "SW of Tachienlu, S of Chiu-lung, 3000 m, in shaded ravines, fl. May 23.1939" W. C. Cheng 988 (holotype–P !).

Sect. 5. **Keiskea** Tamura emend. Ziman & Kadota in J. Jpn. Bot. **79**: 49 (2004).

Ser. 10. **Keiskea**

Sect. *Keiskea* Tamura in Sci. Rept. Osaka Univ. **16**: 26 (1967).

33. **Anemone keiskeana** T. Ito ex Maxim. in Bull. Acad. Sci. Petersb. **23**: 478 (1888). TYPE: unknown.

Tamuria keiskeana (T. Ito) Starod. in Vetrenitsy 122 (1991).

Rhizomes long horizontal, branched, 5–10 × 3–5 mm, and stolons ca. 1 mm in diameter. Basal leaves 1–3; petioles basally vaginate, 10–30 cm × 2–3 mm, subglabrous; blades 3-sected, rhombic-pentagonal, 3–8 × 3–7 cm, sparsely puberulent; leaflets subsessile; central leaflets narrow-rhombic; bases broadly cuneate; margins dentate; apices acute to acuminate; lateral leaflets similar to central ones. Scapes 10–20 cm long, subglabrous; cymes 1-flowered. Involucral leaves sessile, basally slightly connate; blades 3-lobed to shallowly incised, ovate-oblong, 2–5 × 1–3 cm; bases broadly cuneate; margins incised-dentate or toothed; apices acuminate; subglabrous (Fig. 1Y). Pedicels 2–6 cm long, sparsely puberulent. Tepals 10–22, linear-lanceolate, white or reddish, 12–20 × 3–5 mm, basally sparsely puberulent; basal veins 3, vein anastomoses absent (sometimes solitary). Stamens 3–7 mm long; filaments basally slightly dilated and compressed; anthers ellipsoid, connectives wide. Ovaries on stalks ca. 1 mm long, ovoid, 2–3 mm long, slightly compressed, sparsely covered with hairs 0.1–0.3 mm long; styles conic, straight, ca. 1 mm long; stigmas subcapitate (Fig. 2Z_1). Achenes bodies on stalks 0.5–0.7 mm long, ovoid-ellisoid, slightly compressed, with narrow ribs, ca. 4–5 × 2–3 mm, sparsely puberulent (hairs ca. 0.2 mm long); styles straight to curved, ca. 1 mm long, glabrous; stigmas triangular-subulate (Fig. 3U).

Chromosome number: n = 14 (Baumberger 1970).

Distribution: Japan (Honshu, Shikoku, Kyushu); in forests.

Initially *A. keiskeana* was regarded (Ulbrich 1906) as a member of sect. Anemonanthea, and afterwards Kurita (1957) proposed to include this species into genus *Hepatica* or separate it as a monotypic genus. Tamura (1967) separated *A. keiskeana* as a section of *Anemone*, and Starodubtsev (1991) considered this section to be a distinct genus and treated a North American *A. deltoidea* as another member of this genus. According to our data, *A. keiskeana* differs from *A. deltoidea* by its few 3-sected basal leaves with distinct petioles and blades, developing before anthesis, 3-lobed involucral leaves, 10–22 linear-lanceolate puberulent tepals, and compressed ovaries and achenes on longer stalks.

Specimens examined: JAPAN; Yamashiro Prov., inter Hozukyo et Kameoka, 15.9.1959, Murata 5972 (LE); Kochi Pref., 12.3.1935, Yoshinago (LE); Kochi Pref., Sakaka-cho, Takaoka-gun, 9.3.1940, Makino (LE); Hondo: Yagimachi, in Tunba, 19.3.1955, Togashi 1155 (LE).

Ser. 11. **Deltoideae** Ziman, Kadota & Bulakh in J. Jpn. Bot. **79**: 49 (2004).

34. **Anemone deltoidea** Hook. f. ex Dougl. in Fl. Bor. Amer. 16 (1830). TYPE: U. S. A.: "In sylvis densis umbrosis ad oras Columbiae, Douglas" (holotype-BM !).

Tamuria deltoidea (Hook. ex Dougl.) Starod., l.c. (1991).

Rhizomes long horizontal, branched, ca. 2 mm in diameter. Basal leaves 2–3, scale-like, and solitary, with distinct blades; petioles 10–15 cm long, glabrous; blades ternate,

pentagonal, 3–5 × 3–7 cm, glabrous; leaflets subsessile; central leaflets ovate to rhombic, somewhat deltoid; bases broadly cuneate; margins crenate to serrate; apices acuminate; lateral leaflets similar to central leaflets. Scapes 10–30 cm long, glabrous; cymes 1-flowered. Involucral leaves 3; petioles 2–5 × 1–2 mm; blades undivided, ovate-rhombic, 4–8 × 2–3 cm, subglabrous; bases broadly cuneate; margins crenate to serrate; apices acuminate (Fig. 1Z). Pedicels 3–6 cm long, sparsely puberulent. Tepals 5, ovate to obovate, white, 12–20 × 12–15 mm, glabrous; basal veins 5–7, vein anastomoses absent (sometimes solitary). Stamens 3–5 mm long; filaments filiform; anthers ellipsoid, connectives wide. Ovaries on stalks ca. 1 mm long, ovoid, slightly compressed, 1.5–2 mm long, basally covered with hairs ca. 4 mm; styles straight, 0.5–1 mm long; stigmas subcapitate (Fig. $2Z_2$). Achene bodies on stalks 1.5–2 mm long, subglobose, slightly compressed, with narrow ribs, 3–5 × 2.5–3 mm, puberulent (hairs 0.2–0.3 mm long); styles straight to subulate, 0.5–1 mm long, glabrous; stigmas linear (Fig. 3V).

Distribution: NW North America: U. S. A. Washington, Oregon, California; in forests and margins, alt. 200–2000 m.

During a lot of years this species was regarded as a member of sect. Anemonanthea, and recently Tamura (1995) again confirmed the affinity of *A. deltoidea* to the North American species of the foregoing section. However, Starodubtsev (1991) proposed to separate *A. deltoidea* (together with *A. keiskeana*) from *Anemone* as a genus *Tamuria* and Dutton (1996) noted the unsimilarity of the *A. nemorosa*-group and *A. deltoidea* and paid attention on its peculiar number of chromosomes (n = 7). *Anemone deltoidea* is close to *A. keiskea* indeed and has to be regarded as a member of sect. Keiskea, but as a monotypic series Deltoideae.

Specimens examined: U. S. A.; Oregon. Sauvil's Island, 5.1886, Howell (LE); Lime Co., near Hisk Lake, 23.8.1897, Corville (WU); Elk Meadows, 18.7.1925, Thompson 293 (K); Washington: Caskade Mts., Upper Valley of the Nesqually, 8.6.1893, Allen (LE); 7.1895, Allen (K); 8.8.1895, Allen (LE); Mt. Rainier National Park, 5.8.1916, Hunnewall (NY); Pierce Co., Indian Reservation, 16.5.1937, Everdam (LE).

Discussion

Our comparative study of the taxa within Anemonanthea s. l. showed that scape, basal leaf petiole and pedicel length are high variable, but that there is little difference in the size of the basal and involucral leaf blades. The length of involucral leaf petioles in most species is 1–3 cm (sometimes 2–5 cm) as in *A. udensis*, *A. debilis*, and *A. grayi*), or ca. 1 cm only, as in *A. raddeana*, *A.ranunculoides*, *A. caerulea*, and *A. uralensis*. The length of the basal leaf petiolules frequently exceeds 2 mm, except for *A. umbrosa* and *A. quinquefolia* in which it is generally 1–2 mm. The majority of species is characterized by solitary flowers. Most species have 5–6 tepals, although several species have 6–8 tepals (*A. nemorosa*, *A. amurensis*, *A. ranunculoides*, *A. trifolia*, *A. oregana*) or even 8–15 tepals (*A. altaica*, *A. pseudo-altaica*, *A. raddeana*, *A. keiskeana*). The tepals of most species are 10–20 × 4–8 mm, but several species have larger tepals (10–25 × 6–12 mm, as in *A. altaica*, *A. pseudo-altaica*, *A. nikoensis*), and one species (*A. reflexa*) is characterized by having the smallest (tepals 5–7 × 2–3 mm). The number of basal tepal veins varies from 3–5 to 5–7, and in most species the tepal vein anastomoses are absent. The stamens in most species are 3–5 mm long, although in several species (*A. nemorosa*, *A. amurensis*, *A. trifolia*, *A. umbrosa*, *A. grayi*) they are 4–8 mm long. The essential morphometric achene characters of most species of subgen. Anemonanthea s. l. taxa are quite similar. Although the achene body size is 2–4 × 2 mm in most

species, in several species (*A. amurensis*, *A. soyensis*, *A. altaica*, *A. pseudoaltaica*, *A. davidii*, *A. baicalensis*) the achenes are larger (4–5 mm long) or even smaller (mainly 1.5–2.5 mm long) in a few species (*A. caerulea*, *A. uralensis* and *A. caucasica*). The achene styles are mainly 1–1.5 mm long, although in several species (*A. stolonifera*, *A. caucasica*, *A. flaccida*) the achene styles are shorter than 0.5 mm. Within the qualitative characters, we regard the types of rhizomes as essential. In particular, the rhizomes may be dimorphic (long horizontal, thin, fleshy and intensively branched, or short, ascending, rather thick). These are not always found because the development of long rhizomes occurs during a rather short period. On the other hand, several taxa always have monomorphic, mainly long rhizomes. Many taxa characteristically have an intensive vegetative propagation and depressed sexual reproduction. Both the basal and involucral leaf blades are ternate (biternate) or 3-sected. Usually the involucral leaf blades are similar to those of basal leaves. The leaflets (or segments) are mainly rhombic (sometimes pentagonal or oblong), of the variability of leaf blade shape (its diagnostic character), with cuneate-like bases, dentate-incised margins and acute or obtuse apices. The basal leaf petioles are long and narrow ans either perish completely or gradually desintegrate basally and thus are surrounded by fibrous remnants, or are sharply dilated (scale-like). The involucral leaf petioles are distinct (narrow or wide) or absent. Basal and involucral leaf petiolules are almost always present, but they differ in size and shape considerably.

Most of taxa are characterized by a monomorphic perianth, although several species (mainly having more than 10 tepals) have a dimorphic perianth consisted of two circles of tepals differing in shape, size, vein anastomoses and hairiness (*A. nemorosa*, *A. ranunculoides*, *A. altaica*, *A. pseudoaltaica*, *A. apennina* and *A. caucasica*). However, in a few species (*A. umbrosa*, *A. stolonifera* and *A. davidii*) the staminodes are either dilated stamens without anthers or dilated carpels without ovaries.

Although the shape of tepals is similar within most taxa, oblong-elliptic or oblong-obovate, with rounded apices and wide bases, sometimes the tepals are linear-lanceolate (*A. caucasica* and *A. reflexa*) or their bases narrowed (*A. amurensis*, *A. debilis*, *A. nikoensis* and others). The tepals of all species are straight or spreading, and only in *A.reflexa* they are bent or reflexed. Within subgen. Anemonanthea s. l. the tepals predominately have a white colour, although in some cases the tepals are greenish, red, blue to purple or yellow, and in several species it varies.

In all species the stamens are numerous, with filiform monomorphic filaments which are sometimes apically dilated (*A. uralensis*, *A. trifolia* and *A. reflexa*) or basally dilated (*A. nemorosa*, *A. caerulea*, *A. pseudoaltaica* and *A. quinquefolia*). In most species the anthers are oblong-elliptic with rather wide connectives, although narrow anther connectives were noted in ten species (*A. umbrosa*, *A. soyensis*, *A. raddeana*, *A. davidii* and others). However, in several specimens of *A. ranunculoides* we noted funnel-shaped apices of filaments, and in *A.reflexa* the filaments were dilated-compressed.

According to our data, in most taxa the achene bodies are ovoid or ovoid-ellipsoid, but subglobose in *A. uralensis* and *A. deltoidea*, and ellipsoid in *A. apennina* and *A. caucasica*. The styles generally are conic, apically curved or substraight, but uncinate styles were noted in *A. caerulea* and *A. exigua* only. The achene bodies are usually rounded basally, but sometimes they are slightly narrowed (*A. udensis*, *A. altaica* and *A. baicalensis*), but distinctly narrowed achene body bases only occur in *A. grayi*, *A. oregana* and *A. baicalensis*. Sessile achenes predominate; distinct achene stalks

are noted only in *A. keiskeana* (0.5–0.7 mm long) and *A. deltoidea* (1.5–2 mm long). Slightly compressed achenes having narrow lateral ribs occur in 17 species of subgenus Anemonanthea s. l. In *A. trifolia*, *A. altaica*, *A. quinquefolia* and others the achene ribs are 0.1–0.2 mm wide (ca. 0.5 mm wide in *A. caucasica*). In most species the stigmas are linear or sublinear in both carpels and achenes, but in eight species (*A. amurensis*, *A. ranunculoides*, *A. altaica*, *A. baicalensis*, *A. deltoidea* and others) the carpel stigmas are subcapitate or subglobose and in mature achenes they are slightly dilated or even sublinear, anlthough only in *A. flaccida* are the achene stigmas distinctly subcapitate.

A high level of variability is characteristic for the pubescence of the basal and involucral leaves, scapes and pedicels. In roughly half of the species (*A. caerulea*, *A. ranunculoides*, *A. baicalensis*, *A. deltoidea* and others) the tepals are more or less puberulent abaxially, and glabrous in the other hal. Almost all taxa are characterized by a dense villosity of the carpels and achene bodies, with hairs mainly 0.1–0.2 long; in only several species (*A. nikoensis*, *A. piperi* and *A. delavayi*) the hairs are longer (0.5–2 mm long), although in several species (*A. soyensis*, *A. reflexa*, *A. grayi*, *A. oregana*, *A. stolonifera*, *A. davidii* and others) the carpels and achenes are subglabrous or scarcely puberulent, and in *A. griffithii* and *A. scabriuscula* they are glabrous. In most species the carpel and achene styles are glabrous, but in several species (*A. nemorosa*, *A. altaica*, *A. quinquefolia*, *A. lancifolia* and *A. baicalensis*) they are puberulent.

As a result of our comparative analysis, the initially circumscribed subgenus Anemonanthea has to be divided into two subgenera, viz., Anemonanthea and Stolonifera.

Only few invariable and important characters are in common to all taxa of both subgenera: distinct horizontal or ascending rhizomes, few basal leaves with long petioles and 3-sected (sometimes ternate) blades, ovaries and achenes densely covered by hairs 0.1–0.3 (rarely 1–2) mm long (puberulent). However, the distinctions between the taxa of these subgenera are considerable: in subgen. Anemonanthea, n = 8; the involucral leaves are petiolate, and the carpels and achenes have mainly linear stigmas; whereas in subgen. Stolonifera n = 7, the involucral leaves are sessile, and the carpels and achenes have mainly dilated or subcapitate stigmas. As circumscribed in this treatment, each subgenus is rather heteromorphic because both include include plants with long and short rhizomes, basal leaves with distinct blades or scale-like ones which develop before or after anthesis, hypogeal or epigeal germination, and 3-colpate, pantocolpate or polycolpate pollen grains. Herein we are treating subgen. Anemonanthea s. str. to consist of three sections, viz., Anemonanthea, Rosulantes and Tuberosa, and 28 species.

All taxa of sect. Anemonanthea are geophytic ephemeroids which are characterized by a short duration of the aerial vegetation. These plants are non-rosetteous because they have solitary reproductive shoots with several small underground persistent scale-like basal leaves. Following flowering, solitary green leaves with distinct blades and long narrow petioles develop on rhizomes apart from the reproductive shoots (not always found and sometimes regarded as absent). Germination is hypogeal (very small scale-like cotyledons develop as underground ones). The pollen grains are 3-colpate.

According to our research, there are 20 species within sect. Anemonanthea which can be classified in five rather discrete groups of taxa which herein are recognized at the series level.

Ser. Anemonanthea includes ten species within which three species (*A. nemorosa*, *A. trifolia* and *A. ranunculoides*) are distributed mainly in Europe (*A. ranunculoides* occurs

also in Asia Minor), *A. uralensis* occurs only in the Urals, and the next six species (*A. amurensis*, *A. caerulea*, *A. udensis*, *A. umbrosa*, *A. debilis* and *A. soyensis*) are distributed in Eastern Asia, mainly in the Far East.

We regard *A. nemorosa*, the type species of sect. Anemonanthea, as a variable taxon, and in following Dutton (1996), the continuous nature of the character variation through the range of this taxon makes recognition of infraspecific entities unwarranted. We believe the specific characteristics of *A. nemorosa* such as its monomorphic rhizomes, ternate glabrous basal and involucral leaf blades with petiolules 3–5 mm long, dilated involucral leaf petioles 1–3 cm long, solitary flowers with 5–7 glabrous sepals having 3–5 vein anastomoses, are the basis for distinguishing this species from other species.

Within ser. Anemonanthea, there are two subgroups differing by the involucral leaf petiole width, carpel style length and stigmas shape. The first subgroup includes two pairs of the allied, so called "sister species". The first pair of species, *A. nemorosa-A. amurensis*, is characterized by involucral leaf petioles 1–3 cm long, involucral leaf blades similar to those in the basal leaves, 1-flowered cymes, a perianth of 5–8 glabrous tepals and achene bodies 3–5 mm long. The second pair of species, *A. caerulea-A. uralensis*, is characterized by involucral leaf petioles 3–5 mm long, involucral leaf blades larger than those in the basal leaves, few-flowered cymes, a perianth of 5 pubescent tepals and achene bodies 1–2 mm long. *Anemone amurensis* differs from *A. nemorosa* by its basal leaflet shape and tepal characters (fewer, monomorphic, narrower, lacking vein anastomoses) and achene body stigmas shape. *Anemone uralensis* differs from *A. caerulea* by its tepal shape, colour and hairiness, and filament shape only, as well as by its the narrow area (endemic to the Urals), and chromosome number (tetraploid).

The second subgroup of ser. Anemonanthea is divided into two sets of species, based mainly on tepal characters (pubescent or glabrous, and presence or absence of vein anastomoses). The first set consists of *A. ranunculoides*, which stands apart because of its involucral leaf petiole length (3–5 cm long), dimorphic tepals with 5–9 vein anastomoses and achene styles 0.8–1.5 mm long. Despite the varied opinions about the affinities of *A. nemorosa* and *A. ranunculoides*, these species differ considerably. Their main distinctions include the involucral leaf petiole shape, characters of the inflorescence, tepal venation, colour and hairiness. On the basis of its tepals and achenes, *A. ranunculoides* is closer to the *A. udensis-A. trifolia* complex. With Dutton (1986), we do not recognize the infraspecific taxa of *A. ranunculoides*. *Anemone trifolia* differs from *A. udensis* by its few-flowered cymes, 5–8 glabrous tepals, and solitary vein anastomoses. Within *A. trifolia* we accept three subspecies, viz., subspp. *trifolia*, *albida* and *brevidentata*.

In the second set of species, *A. umbrosa* differs from *A. soyensis* and *A. debilis* by its basal leaf blade shape, number of tepals and achene hair length. Because of the variability of leaf blade shape (its diagnostic character), we have not found any diagnostic basis for recognizing *A. extremiorientalis*; hence, we regard it as the synonym of *A. umbrosa*. *Anemone soyensis* was initially described as a variety of either *A. umbrosa* or *A. debilis*, and after its separation as a species two morphologically similar taxa were described also, viz., *A. yezoensis* and *A. sciaphila*. However, we regard both of them as synonyms of *A. soyensis*. Moreover, *A. debilis* was separated from *A. ranunculoides* or from *A. caerulea* as a taxon close to either species. According to our data, data, *A. debilis* has several essential characters lacking in *A.*

ranunculoides and *A. caerulea*, but present in *A. soyensis* (e. g., involucral leaves dissimilar to basal ones, and white glabrous tepals without vein anastomoses). Furthermore, these taxa have similar basal and involucral leaflet shapes, as well as similarities in their perianth and achenes. Therefore, we are following Dutton (1996) in accepting a close relationship of *A. debilis* and *A. soyensis*. *Anemone debilis* (diploid) and *A. soyensis* (tetraploid) are distinguished on the basis of their tepal shape, size and colour, and achene shape, size and hairiness. *Anemone gracilis* and *A. linearis* are treated as synonyms of *A. debilis*.

Series Altaicae includes three species, viz., *A. altaica*, *A. pseudoaltaica* and *A. raddeana*, which are distributed in Asia and differ from the other series of subgen. Anemonanthea series by the larger number (mainly 8–15) of dimorphic glabrous tepals and 1-flowered cymes. *Anemone altaica* was initially separated from *A. nemorosa* on the basis of the distinctions in its rhizome and leaf shape, and tepal number and shape, which lead Ulbrich (1906) to regard these two species, together with *A. umbrosa*, as a "species collectiva". In our opinion, *A. altaica* is indeed close to *A. nemorosa* on the basis of several essential characters of the leaves and especially the solitary flowers and tepals (dimorphic glabrous; with 3–5 vein anastomoses), as well as the types of rhizomes, tepals and achenes. We regard *A. altaica* as a sister species to *A. pseudoaltaica* due to many common essential characters (e. g., rhizomes of two types, and solitary flowers with 8–12 glabrous sepals). These two taxa, however, have certain distinctions sufficient to regard them as descrete species (shape of basal leaf blades, tepals, carpels and achenes). *Anemone raddeana* is allied to both of the foregoing taxa on the basis of several essential characters of rhizomes, tepals and achenes, but it differs from these species mainly by its leaf, tepal, and stamen shape. Moreover, *A. altaica* is diploid, and *A. pseudoaltaica* and *A. raddeana* are polyploid taxa. We regard *A. hakodatensis* as a synonym of *A. pseudoaltaica* which has three varieties, viz., vars. pseudoaltaica, gracilis and katonis. In this treatment, *A. raddeana* consists of two varieties (*raddeana* and *lacerata*), but we are not recognizing subspecies *villosa* and *glabra*, and variety *integra*. *Anemone maximowiczii* and *A. juzepczukii* herein are treated as synonyms of *A. pseudoaltaica*.

According to Ohwi (1984), *A. nikoensis* is close to the *A. altaica* complex, but it has several essential distinctions, mainly the involucral leaf petioles, tepal shape and achene hairiness, and we consider that these distinctions are sufficient to recognize *A. nikoensis* at the series level (ser. Nikoenses).

Both the monotypic ser. Reflexae and the North American ser. Quinquefoliae differ from the foregoing taxa mainly by the same characters, but *A. reflexa* differs from the species of ser. Quinquefolia by its few-flowered cymes, small bracteoles, small bent tepals, and very short hairs on the achenes.

Five species (*A. quinquefolia*, *A. lancifolia*, *A. piperi*, *A. grayi* and *A. oregana*) occurring in Canada and the United States are characterized by many essential characters of the rhizomes, leaves and flowers. Consequently, because of these characters in common and their distinctive traits, we regard that this group corresponds to a series level (ser. Quinquefoliae). There are two geographically isolated subgroups, the *A. quinquefolia*-*A. lancifolia* complex occurs in Eastern North America, and the *A. piperi*-*A. grayi*-*A. oregana* complex occurs in Western North America. The former subgroup is closer to the European *A. trifolia* (involucral leaf petioles 0.5–2 cm long, tepals 5, solitary vein anastomoses present, achene styles sparsely puberulent), and the latter to the Eastern Asian *A. soyensis* (involucral leaf petioles 1–3 cm long, tepals 5–7, vein

anastomoses absent, achene styles glabrous). *Anemone lancifolia* differs from *A. quinquefolia* by its lateral leaflet and filament shape, and by the hairiness of the leaves, scapes, ovaries and achenes. We are treating *A. quinquefolia* as consisting of subspp. *quinquefolia* and *minima* (with *A. pedata* as a synonym), and *A. grayi* as consisting of subspp. *grayi* and *lyallii*.

Within the second subgroup, *A. piperi* differs from other two species by its generally vertical rhizomes, several puberulent scapes, and ovaries and achene bodies densely covered with hairs 1–2 mm long. *Anemone grayi* has smaller mainly white or blue tepals, basally narrowed and slightly compressed achene bodies with narrow lateral ribs, whereas *A. oregana* has larger red to blue tepals, basally rounded and not compressed achene bodies without ribs; *A. adamsiana* and *A. felix* are synonyms of *A. oregana*.

We are separating five species from sect. Anemonanthea on the basis of their distinctive features including several basal leaves with distinct blades developing before anthesis (rosetteous shoots), any scale-like leaves (but basal remnants of old leaf petioles), epigeal germination, pantocolpate pollen grains, basally gradually dilated leaf petioles, 1-few-flowered cymes, 5 tepals, and subglabrous or glabrous achene bodies. Herein these five species (*A. stolonifera* occurs in Japan, China and Korea, *A. griffithii* in China, India, Bhutan, Nepal, Sikkim, and *A. davidii*, *A. exigua* and *A. scabriuscula* are endemics of China) are treated as a section (sect. Rosulantes).

Within section Rosulanthes, there are two distinct subgroups which we regard as series, viz., Rosulanthes and Exiguae, which differ by key differencies in their scapes, involucral leaf petiole length, presence or absence of bracteoles, tepal vein anastomoses and hairiness, presence or absence of staminodes and achene shape.

Anemone davidii was initially described as a variety of *A. stolonifera*. Although *A. davidii* is indeed close to *A. stolonifera*, it differs by its larger tepals having 5–15 vein anastomoses, staminodes between stamens and carpels and subcapitate carpel stigmas. *Anemone exigua* is a distinct species having involucral leaf petioles 3–5 mm wide and basally connate, and sparsely puberulent ovaries and achenes. The very close *A. griffithii* and *A. scabriuscula* differ one from another by their involucral leaf blade shape, achene style length and stigmas shape. In this treatment, *A. siuzevi* is a synonym of *A. stolonifera*, *A. petiolulata* is a synonym of *A. davidii*, *A. takasagomontana* is a synonym of *A. exigua*, and *A. nanchuanensis* is a synomym of *A. griffithii*.

Section Tuberosa includes two species characterized by tuberous rhizomes, few basal leaves developing before flowering, with long petioles sharply dilated at the base and scale-like, ternate blades, 3 petiolate involucral leaves similar to basal leaves, 1-flowered cymes, 8–12 tepals, 3-colpate pollen grains, and epigeal germination. Its species, *A. apennina*, *A. blanda* and *A. caucasica*, have recognizable distinctions, including the shape of rhizomes, size of basal leaf and involucral leaf petioles, size of tepals and achenes, shape of achene bodies, styles and stigmas. Herein, we are treating *A. blanda* as a distinct species (*A. apennina*).

Finally, two sections (Stolonifera and Keiskea) are separated from the foregoing sections and are herein recognized as a distinct subgenus Stolonifera, which differs from subgen. Anemonanthea by its sessile involucral leaves, tendency to stalked carpels and achenes, and hardly recognizable styles and dilated stigmas, polycolpate pollen grains, and a chromosome base number of $n = 7$. Sections Stolonifera and Keiskea are distinguished from each other by number and shape of involucral leaves, number of flowers and their tepals, and essential characters of achenes (sessile or stalked achenes, styles

distinct or hardly recognizable, and stigmas linear or dilated).

Sect. Stolonifera includes four species, *A. flaccida*, *A. delavayi*, *A. baicalensis* and *A. prattii*, which occur in Eastern Asia and which differ from other species in subgen. Anemonanthea s. l. mainly by their carpel stigma shape, smaller style size and villosity. On the basis of our research, these species are rather close to other species of subgen. Anemonanthea s. l. on the basis of comparable achene characters. Consequently, we see no reason to classify them in a separate genus *Arsenjevia*, as Starodubtsev (1989) and others proposed.

Following Juzepchuk (1937), we recognize two series within section Stolonifera, viz., Stoloniferae (not Baicalenses) and Flaccidae. According to our data, on the basis of the basal leaves and shoots, the taxa of ser. Stoloniferae are closer to those of sect. Rosulantes, whereas the taxa of ser. Flaccidae are closer to sect. Anemonanthea, because the taxa of ser. Stoloniferae have rosetteous shoots surrounded by remnants of basally vaginate bases of petioles, sevearl basal leaves having distinct blades which develop before anthesis, whereas in ser. Flaccidae the basal leaves are scale-like only, and leaves with distinct blades develop only after anthesis some distance from the reproductive shoots.

The taxa of ser. Stolonifera (*A. baicalensis* and *A. prattii*) are distinguished on the basis of their rhizomes (stolons aboveground or underground), tepal size and vein anastomoses, and achene shape. *Anemone baicalensis* is a variable taxon consisting of five varieties (*baicalensis*, *kansuensis*, *saniculiformis*, *litoralis*, and *glabrata*) which differ by tepal size, stigma shape and hairiness of ovaries, leaves and scapes. In this treatment we regard *A. ulbrichiana*, *A. rossii* and *A. brevistyla* as the synonyms of *A. baicalensis*.

The taxa of ser. Flaccidae (*A. flaccida* and *A. delavayi*) differ one from another by the number of basal leaves and scapes, bracteoles (present or absent), tepal size and vein anastomoses, and achene body hairiness. *Anemone flaccida* is a rather variable taxon which includes four varieties (*flaccida* , *hirtella*, *hofengensis*, and *anhuensis*) which differ mainly by tepal number, shape and size, and anther and stigma shape. We regard *A. laevigata* and *A. flaccida* var. *laevigata* as the synonyms of *A. flaccida*. After an examination of available herbarium material, we regard *A. delavayi* as closer to *A. flaccida* (not to *A. baicalensis* as in Wang 1974) mainly because of the distinctions of the basal leaves and seasonal development of shoots. Herein *A. delavayi* consists of two varieties (delavayi and oligocarpa which differs from the former variety by smaller flowers and sessile turbinate stigmas).

Section Keiskea includes two species, *A. keiskeana* (occurs in Japan) and *A. deltoidea* (W North America). We regard these species as representatives of two discrete monotypic series (Keiskea and Deltoidea) which differ in their rhizome thickness, number, shape, vein anastomoses and hairiness of tepals, length of achene stalks, shape and hairiness of achene bodies, and shape of the stigmas. In our opinion, although *A. keiskeana* merits recognition as a monotypic series, we have no reason to confirm its separation as genus *Tamuria* (Starodubtsev 1991).

The evolutionary trends within Anemonanthea s. l. appear to include a change of monomorphic perennial rhizomes to dimorphic (combination of short-nodulose nodes and long short-lived stolons), enlargiement of involucral leaf blades, and a dilation of the petioles because of an increasing role as assimilating organs. With respect to the evolutionary trends of flowers, there is a reduction of several-flowered cymes to solitary flowers, development of a dimorphic perianth, reduction of tepal vein anastomoses and their pubescence, and a change of a var-

ied tepal number to either a 5-leaved or many-leaved perianth.

Results

As a result of our comparative analysis of the essential morphological characters of subgen. Anemonanthea, we are dividing this group of taxa into two subgenera (Anemonanthea and Stolonifera, comb. et stat. nov.). In this treatment subgen. Anemonanthea includes three sections (Anemonanthea, Rosulantes, sect. nov. and Tuberosa), and that subgen. Stolonifera includes two sections (Stolonifera and Keiskea).

As treated herein, sect. Anemonanthea consists of five series (Anemonanthea, Altaicae, comb. et stat. nov., Nikoenses, ser. nov., Reflexae, and Quinquefoliae, ser. nov.) with a total of 20 species. Within these series, we are not recognizing interspecific taxa of *A. nemorosa* and *A. ranunculoides*, but we are accepting *A. trifolia* subspp. *trifolia*, *albida* and *brevidentata*, *A. pseudoaltaica* vars. *pseudoaltaica*, *gracilis* and *katonis*, *A. raddeana* vars. *raddeana* and *lacerata*, *A. quinquefolia* subspp. *quinquefolia* and *minima*, and *A. grayi* subspp. *grayi* and *lyallii*. In addition, we regard *A. yezoensis* and *A. sciaphila* as synonyms of *A. soyensis*, *A. maximowiczii*, *A. juzepczukii* and *A. amagisanensis* as synonyms of *A. raddeana*, *A. pedata* as synonyms of *A. quinquefolia*, *A. adamsiana* and *A. felix* as synonyms of *A. oregana*.

Sect. Rosulantes includes two series (Rosulantes and Exiguae, ser. nov.) and five species. Within this section we regard *A. siuzevi* as a synonym of *A. stolonifera*, *A. petiolulata* as a synonym of *A. davidii*, *A. takasagomontana* as a synonym of *A. exigua* and *A. nanchuanensis* as a synonym of *A. griffithii*.

Sect. Tuberosa consists of two species, *A. apennina* and *A. caucasica*. We regard *A. blanda* as a subspecies of *A. apennina* with *A. pyrenaica* and *A. caerulescens* as synonyms.

Sect. Stolonifera consists of two series (Stoloniferae and Flaccidae) and four species. We accept *A. baicalensis* as consisting of five varieties (*baicalensis*, *glabrata*, *litoralis*, *kansuensis* and *saniculiformis*), but we regard *A. ulbrichiana*, *A. rossii* and *A. brevistyla* as synonyms of *A. baicalensis*. We accept the variable *A. flaccida* as having four varieties (*flaccida*, *hirtella*, *hofengensis* and *anhuensis*), but we regard *A. laevigata* as a synonym of *A. flaccida*. According to our data, *A. delavayi* includes two varieties (*delavayi* and *oligocarpa*).

Finally, sect. Keiskea consists of two monotypic series (Keiskea and Deltoideae, ser. nov.).

In delimiting the taxa within subgen. Anemonanthea s. l., we followed Tamura (1995), in addition to a number of other characters, viz., chromosome numbers, types of pollen grains and carpels, germination type and time of basal leaf development, types of rhizomes, shoot structure, shape and size of basal and involucral leaves, tepal number, shape, venation and villosity.

This treatment consists of a conspectus of subgen. Anemonanthea s. l., together with brief description of the morphological characteristics of two subgenera, five sections and 11 series, as well as Latin diagnoses of seven new infrageneric taxa.

The presence of many significant characters (especially those of the shoots and achenes) in common to all taxa reflect the longstanding and well-defined habitats (shady forests or under bushes) and an ancient origin and differentiation of this group.

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パート III では，23. *Anemone exigua* Maxim.，24. *A. griffithii* Hook. f. & Thoms.，25. *A. scabriuscula* W. T. Wang，26. *A. apennina* L.，27. *A. blanda* Schott & Kotschy, 28. *A. caucasica* Willd. ex Rupr. 29. *Anemone baicalensis* Turcz., 30. *A. prattii* Huth ex Ulbr.，31. *A. flaccida* F. Schmidt ニリンソウ，32. *A. delavayi* Franch. の10種について，異名を整理するとともに再記載を行った．

また，本稿で認めた32種について，総苞葉（茎葉）及び花と痩果を図示した．

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